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AIRPOWER IN THE NEXT MILLENNIUM

by

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Abstract

What should the United States Air Force be able to accomplish in the next millennium? Should we acquire new weapons systems that will cost the United States hundreds of billions of dollars? What part should airpower doctrine play in weapons system acquisition? How will changes in technology drive changes in operations and weapons system acquisition. How have airpower doctrine changes occurred in the past? Can we draw accurate conclusions of what the future should or could be by looking to the history of airpower? Chapter One looks at the development of Airpower Doctrine from the early days of the Army Air Corps, up through the end of World War II. Chapter Two addresses the issue of Airpower Doctrine by analyzing and tracing the history of Air Force Doctrine since World War II. This chapter includes recommendations for sweeping changes to prepare the United States Air Force to meet the challenges of the next millennium. Chapter Three looks at the United States Air Force in the Next Millennium. Primary focus of this chapter is future Air Force weapons systems, and their acquisition. The objective of the research is to determine what capabilities the Air Force should have in the 21st Century—this is most easily defined in terms of weapons systems. The primary method of research for this project was extensive review of past, current and future airpower documents. These documents included everything from Air Force Historical Studies, to the latest version of “Global Engagement: A Vision for the 21st Century Air Force.

Chapter 1

World War II Airpower Doctrine

Introduction

In the *Command of the Air*, Giulio Douhet wrote “...for now it is possible to go far behind the fortified lines of defense without first breaking through them. It is airpower which makes this possible. The guiding principle of bombing actions should be this: the objective must be destroyed completely in one attack, making further attack on the same target unnecessary.”¹ What should the United States Air Force be able to accomplish in the next millennium? Should we acquire new weapons systems that will cost the United States hundreds of billions of dollars? What part should airpower doctrine play in weapons system acquisition? How will changes in technology drive changes in operations and weapons system acquisition. How have airpower doctrine changes occurred in the past? Can we draw accurate conclusions of what the future should or could be by looking to the history of airpower? These are the themes that define this research project.

This chapter analyzes the development of airpower doctrine employed by the United States during World War II (WWII). The primary focus is on the pre-war years when the strategic bombardment doctrine was established. The goal of this research is to provide a

discussion about the development of airpower doctrine. The primary method used in this paper is historical research. The proposition put forth by this paper is that the United States entered WWII with a strategic bombardment doctrine that was based on faulty assumptions which were not fully operationally tested and validated prior to becoming national military policy. The second premise is that the US entered WWII with airpower doctrine that did not fully integrate potential warfighting tools, tactics, techniques, and procedures. Blind loyalty by airpower leaders to the dogmatic belief that the bomber will always get through resulted in the misapplication of airpower. These faulty assumptions resulted in long range fighters not being available early enough to establish air superiority over the German heartland thus contributing to thousands of unnecessary losses.

While there were hundreds of battles, campaigns, and issues to consider, it was imperative that the focus of this research be limited to airpower doctrine. I selected this subject because there is potential current day value to further discussions about airpower doctrine. What we learn of the past will assist in our search to develop a cohesive doctrine for the US Air Force that ties the capabilities at the tactical level to the strategic level via a new operational level doctrine that has yet to be established.

Background

World War I (WWI)—Billy Mitchell

Dr. Thomas Greer points out in the monograph, *“The Development of Air Doctrine in the Army Air Arm 1917-1941,”* that WWI ended before airpower advocates in America had a chance to demonstrate the full capabilities of airpower. Unfortunately for Brigadier General William (Billy) Mitchell and other airpower leaders, WWI was predominately fought and won by land armies. In his book, *Winged Defense*, Billy Mitchell said that

WWI, "...the European War, was only the kindergarten of aviation. It had machines that were just invented, the possibilities of their use were just beginning to be understood by the aviators themselves, while others looked on them as strange creations that were defying all known laws of science, of custom and of war."² Had WWI continued, the new doctrine of airpower might have been proven. However, American airpower leaders had to go through the inter-war years as mere theorist. During the 1920s and 1930s, they sought to validate their theories by waging an uphill battle against the status quo. Not only did they have army and navy officers to convince; they had the Departments of Navy and War, as well as the General Staff; all firmly entrenched in their beliefs of naval and land warfare.³ At the end of WWI, US military aviation was in the embryonic stages of development. In 1917, the US ranked 14th in strength internationally, among nations with aviation forces.⁴

WWI—Trenchard, Mitchell, And Gorrell

One of the early airpower proponents of strategic bombardment was Major General Sir Hugh M. Trenchard from Great Britain. The German Zeppelin bombing raids against London in 1917 led to the establishment of the Royal Air Force (RAF). On 5 June 1918, General Trenchard became the Independent Air Force Commander. From 6 June 1918 until the end of WWI, five months later, Trenchard's newly independent RAF dropped 550 tons of explosives on German targets. The British effort was four times greater than the bomb load dropped by the American flyers during the same amount of time. General Trenchard's actions and leadership as a proponent of airpower firmly established him as the key airpower leader of his day. Trenchard's early efforts greatly influenced the other airpower enthusiasts, such as Billy Mitchell and Giulio Douhet.⁵ However, Trenchard

was not the only strategic bombing advocate. In a paper, many years later, Major General Laurence S. Kuter described the writings of Lieutenant Colonel Edgar S. Gorrell as “the best early exposition of this doctrine...the earliest, clearest, and least known statement of the American conception of airpower.”⁶ Colonel Gorrell worked for the Air Service in the technical section. He studied the bombing requirements for WWI. On 3 December 1917, he was made the head the advance zone Strategical Aviation Branch of the Air Service. Gorrell’s job, as the head of the advance team, was to develop strategic employment plans for the American air effort when they would be able to provide forces at a later date. Gorrell spent much time with British flyers learning all that he could about strategic bombing. From his research, he developed a strategic operation plan that was approved by the Air Service in 1917. His plan would later become the foundation of the strategic bombing theories espoused at the Air Corps Tactical School (ACTS). Gorrell’s writings observed that land warfare had ground to a halt, and to achieve victory in war, you must take the fight to the enemy. He pointed out that both the Germans and the allies had begun to develop concepts of aerial bombardment. He was convinced that the Germans had a distinct advantage in developing bombardment capabilities. He argued very strongly for the immediate development of an offensive bombing capability to be able to take the fight to “...commercial centers and lines of communications...to cause the cessation of supplies to the German front.”⁷

In the book, *Ideas, Concepts, Doctrine, Volume I*; Mr. Robert Frank Futrell indicated that in 1917, Colonel Gorrell was responsible for acquisition of European air materials. While on the advance team, Gorrell came to believe that the US should pursue an aggressive build-up of a bombing fleet. This fleet would be used eventually to join in on

the war with Germany. Colonel Gorrell identified a requirement for approximately 3,000 to 6,000 bombers.

Caproni And Douhet

Mr. Futrell points out that in October 1917, Gorrell corresponded with Italian aircraft manufacturer Caproni. Apparently, "...sometime during October, Caproni collaborated with his friend Giulio Douhet in the preparation of a *"Memorandum on the 'Air War' for the US Air Service;"* which urged that mass attacks made at night by long-range allied bombers against industrial targets deep within Germany and Austria definitely could overwhelm the enemy by substantially reducing his war production at the same time that Allied production was increasing. That same month, Caproni gave Gorrell the book, *"Let Us Kill the War; Let Us Aim at the Heart of the Enemy."* The book was apparently written by a journalist to represent Caproni's views on the concept of strategic bombardment.⁸ Mr. Futrell was not the only author to make the Caproni connection. Robin Higham pointed out in the book, *Airpower, A Concise History*, that "...American officers had had some contact with Caproni, who tactfully had his doctrine printed in English. Strategic bombing and the concept of an independent air force for them went hand in hand."⁹

It is not clear if Gorrell was already a proponent of strategic bombing before or after he was given the Caproni book. However, Colonel Gorrell very effectively argued his point that the way to "...stop German shells and planes at the front...was to destroy the producing factories. An army could be compared to a drill; the point would continue to bore only if the shank remained strong. If the shank (the support national effort) be broken, the drill would fail."¹⁰ This argument for airpower was to become a key and

often used metaphor for Air Corps Tactical School discussions many years later.¹¹ Gorrell and Trenchard both supported the concept of a 24 hour-per-day bombing campaign. However, Gorrell's plan did not agree with Trenchard's idea of spreading out air forces over a large area. Gorrell believed that hitting the enemy with fewer bombs over a wider area would not be as effective. Colonel Gorrell proposed that all available forces be concentrated on a single target each day. His position was that, "manufacturing works would be wrecked and the morale of the workmen would be shattered."¹² A quarter of a century later, Colonel Gorrell's idea of mass and concentration proved to be more in line with the allied air campaign of "saturation attacks of 1944 and 1945."¹³

Discussion

Independent Air Arm

Many of these same principles were also included in Billy Mitchell's campaign for an independent air arm. He clearly argued for the concept of taking the battle to the enemy's heartland. He stated that "...now an attack from an air force using explosive bombs and gas may cause the complete evacuation of and cessation of industry in these places."¹⁴ General Mitchell envisioned a future where great air battles would take place and other elements of the military would become secondary. Mitchell's argument for air supremacy is still valid today. If you have air supremacy, then you can fly over the enemy's homeland at will.¹⁵ However, Billy Mitchell also stated that, "...putting an opponent on the defensive in the air is much more valuable comparatively than putting him on the defensive on the ground."¹⁶ Regardless of the claims that Mitchell made, few of the senior Army or Navy leaders would agree that airpower was decisive in WWI. However, he argued that airpower was proven to be the only effective defense against

aerial attack. The way you would achieve victory was through air-to-air combat. Mitchell argued for seizing the initiative, attacking the enemy's aircraft on the ground to force them into the air to defend themselves.¹⁷ Others would argue that it would be better to just destroy the aircraft on the ground before they were able to get airborne.

As stated earlier, one of the many challenges for General Mitchell was that WWI was over before the claims of airpower dominance could be validated. He boasted about the great capabilities of airpower. He argued that airpower would be able to strike at the heart of the enemy's country and establish air superiority; to be able to fly at will over the enemy's homeland. He prophesied great air armadas attacking the enemy's centers of production, transportation networks, ports and shipping, and even agricultural areas. Primarily, Mitchell saw airpower as a way to destroy the enemy's means of making war. He argued that in future wars a nation that fully developed their airpower would have lightning capability to win rapid victories that would produce a lasting peace. In the process, Billy Mitchell proposed drastic reductions in the Navy. He anticipated that, except for the submarine, there would be no need for surface ships. The elimination of all of that unnecessary shipping would save tremendous amounts of money because you would no longer have to support such a large infrastructure.¹⁸ Mitchell was very aware of the political realities of the federal budget. He knew that with an independent air arm would come a separate budget. As long as the Air Service was funded through either the Army or the Navy, the Air Service would always be treated like an auxiliary. He understood that auxiliary status meant that "non-aviators" would determine the funding level for the Air Service.¹⁹

Drive For Independent Air Arm Continues

Another challenge for Billy Mitchell was that he saw the rest of the world, all the great nations, establishing independent air forces and a completely separate doctrine for employment of airpower that was separate from army and navy doctrine. He saw the air force as a “special class of people, like the armored knights in the Middle Ages.”²⁰ The special class referred to the new dimension of the air, as opposed to soldiers and sailors who operated from the land and sea. One of his main arguments was for specialized training provided for airmen, by airmen. During peacetime, the small Air Service element of the Army, accounted for almost half of all the deaths in the Army. During wartime, flight personnel losses are a proportional percentage of the deaths. General Mitchell argued for total equality. His goal was a completely separate service equal to both the Army and the Navy. In many other ways, General Mitchell was equally forward thinking. He proposed a single Department of National Defense, as we have today, to replace the Navy and War Departments. He saw the potential for economic efficiency in consolidating some of the efforts that were duplicated from service to service.²¹

Organizational Plan...Roles And Missions

It is obvious that Billy Mitchell had done much thinking about an independent air arm. In *Winged Defense*, he lays out a command structure and also addresses roles and missions issues. He indicated that pursuit aviation was the primary fighting force. Their role was to seek out and destroy the enemy to establish air superiority. The role of the bombardment force was to destroy enemy ground or water targets. He also perpetuated the myth that the bomber would always get through saying that anti-aircraft artillery was ineffective and never stopped an actual attack. However, in stark contrast, he also said

that pursuit aviation always had to support the bombers.²² Unlike Douhet and Gorrell, Mitchell did see the mix of pursuit and bomber forces as a better warfighting package. It is unfortunate that both platforms were not developed equally. The next air element was attack aviation, which Mitchell saw as close air support and for the destruction of ships, railroad trains, convoys, any target on the ground or the sea.²³

Fighter & Bomber Debate

Major General Haywood S. Hansell, Jr., wrote in *The Air Plan That Defeated Hitler*, that the fighter versus bomber debate raged on at the ACTS. The divisive controversy developed as a polarizing argument. The bomber versus the fighter issue became the center of doctrinal development. The ability of the bomber to make it to where they could drop bombs on target, and return safely, was key to the debate. However, the debate raged on, since the lessons from WWI were anything but conclusive.²⁴ The greatest challenge to the bomber theory was the enemy's ability to field an effective fighter force and anti-aircraft artillery system. At the ACTS, Ken Walker and Harold George were the Bombardment Section advocates; their opponent in the debate was the Pursuit Section under Claire Chennault. Fight and debate as they did, in 1932, the issue would not be resolved. Billy Mitchell had argued that pursuit aviation was the main element of the fighting line due to the inherent offensive capabilities.²⁵ Claire Chennault pursued the same logic. He said that since pursuit aviation employed offensive tactics, it was the most important branch of the air arm.²⁶ However, unlike Mitchell, Chennault was not interested in signing up for bombers escort duty. After the champion of the pursuit cause, Claire Chennault, left the ACTS, the issued faded from importance. The bombardment section recognized the importance of fighter escort, but due to the

shortsighted approach the Army had taken with aviation, pursuit aircraft with the necessary combat radius did not exist.²⁷

Ohio Maneuvers

Personnel from the Air Corps Tactical School participated in flying exercises to test the tactics they were teaching at the ACTS. However, while some may have questioned the lessons learned, it never stopped them from becoming the gospel to reinforce the current teachings at the school. In May of 1929, Major Walter H. Frank, assistant commandant of the Air Corps Tactical School, served as chief umpire at the annual Air Corps maneuvers in Ohio. His *impartial findings* after the exercise were: "...there is considerable doubt among the umpires as to the ability of any air organization to stop a well organized, well flown air attack. The difficulty that pursuit had, not only in attacking but in finding some of the missions that were sent into hostile territory during these maneuvers, would make it appear that a well planned air force attack is going to be successful most of the time."²⁸ Mr. Futrell indicated that Major Frank obviously had studied Douhet's writing, since he observed: "Douhet, a well known Italian writer, says that 'now that aviation has entered the ranks as a means of carrying on war, more than ever war is going to be a question of give and take.' It emphasizes the fact that air force is principally an offensive weapon rather than a defensive one."²⁹ Mr. Futrell goes on to note that back at the ACTS, Lieutenant Walker saw the major significance of the theorem that "a well organized, well planned, and well flown air force attack will constitute an offensive that cannot be stopped."³⁰ The revised ACTS text *The Air Force*, issued in April 1930, boldly stated: "a defensive formation of bombardment airplanes, properly

flown, can accomplish its mission unsupported by friendly pursuit, when opposed by no more than twice its number of hostile pursuit.”³¹

Foulois...Early Doctrine And Organization

While the Air Corps Tactical School was busy training students in the finer aspects of strategic bombardment, the senior leadership in the Air Service was busy trying to solidify the mission of the service. In the book, *Foulois and the US Army Air Corps*, John F. Shiner indicates that when Foulois took over as Chief of the Air Service, “air doctrine was in a state of confusion; despite years of thought, Air Corps officers had developed no comprehensive statement on the employment of airpower.”³² In 1931, bombardment doctrine continued to be taught, yet—without long range aircraft, the teachings remained as untested theories. By the time Foulois left the Air Service, they had clearly stated its strategic bombardment doctrine. Additionally, Foulois persuaded the War Department to admit that the air arm was of vital importance and to endorse the Air Service mission of strategic air operations in support of land campaigns.³³

Bombardment Doctrine And Pursuit Aviation

Through the early to mid 1930s, strategic bombardment continued to be the primary warfighting concept at the ACTS. The school solution of bombardment doctrine prevailed. They concluded that “pursuit or fighter airplanes operating from front line airdromes will rarely intercept modern bombers except accidentally.”³⁴ Even with the strong advocacy from the ACTS being in support of bombers, Colonel Arnold suggested that the Air Corps develop a two-place, long-range pursuit aircraft that would be able to provide escort for bombers.³⁵ Colonel Arnold was not alone in asking for long range

pursuit aircraft. Lieutenant Colonel A. H. Gilkeson, commander of the 8th Pursuit Group, stated bluntly that “this recent academic tendency to minimize, if not entirely dismiss, the consideration of the fighting force as a powerful and extremely necessary adjunct of the air force has led to the teaching of doctrines which have not been established as being true and might even be fatally dangerous to our aims in the event of armed conflict.”³⁶ Gilkeson stated “a superior fighting force will always gain control of the air in at least a restricted sense.”³⁷ Part of the problem was the infighting from within the Air Service just to resolve the issue to elevate it for consideration. The second challenge, was the Army still controlled the budget. Not only would giving the Air Service money for airplanes directly impact the available funds for other land force requirements, it could possibly lead to more support for the growing Air Service to become an independent branch of the military. However, eventually, men of reason prevailed. In 1935, General Westover directed the Air Corps Board determine Air Corps interceptor requirements. Additionally, the Air Corps Technical Committee identified interceptor characteristics in 1936. In 1937, the Air Corps Board recommended the immediate development of an interceptor. The interceptor requirements identified by the Air Corps Board included an aircraft cannon and at least 20 percent greater speed than proposed bombardment planes. These actions eventually led to the P-38 and P-40.³⁸ Dr. Greer stated in his works on Army Air Doctrine that “...Captain Claire Chennault noted in his pursuit aviation textbook, written in 1933, that the postwar period was, in fact, characterized by neglect of pursuit design. Consequently, the speed of pursuit was but slowly increased through the expedient of successively larger engines; there was no real progress in airframe efficiency.”³⁹

More Army/Navy Roadblocks

However, the Army and Navy Departments were not yet convinced that they wanted to share any of their empire with the Air Service. Robin Higham points out in the book, *Air Power*, that “...in 1938 the B-17 squadron intercepted a liner 725 miles at sea to demonstrate the army’s ability to frustrate attacks on the US coast, and the Army and Navy Joint Board supported the army general staff in saying that nothing bigger or longer-ranged than the B-17 would be needed, a vote of confidence which nearly killed the B-29 of later long-ranging pacific fame. Had they prevailed, when war came the US would have had no aircraft capable of being a grand-strategic let alone an intercontinental-bomber. Doctrinal and technological developments were enmeshed in political problems.”⁴⁰

Us Strategic Bombing Survey

The United States Strategic Bombing Surveys credit allied air power for being decisive during WWII.⁴¹ There are many historical examples to show that the US eventually overcame the blind faith they had in strategic bombardment without fighter escort. Once long range fighter escort became available, new employment concepts were developed. Fighter escort and pursuit aviation led to the total air superiority over the enemy.⁴² Had the allies not achieved air superiority, attacks on the industrial base would have been inadequate. While the enemy’s economy was severely impaired, it is interesting to note that contrary to the belief that strategic bombardment would devastate the war-making industry, no vital industry was permanently destroyed with a single attack. Continued re-attacks were necessary.⁴³

FM100-20

General Foulois was credited with establishing an official air Service Bombardment Doctrine developed at the ACTS in the mid 1930s. However, it was not until 21 July 1943 when Command and Employment of Air Power, FM100-20, was published; that the Air service finally had formalized doctrine.⁴⁴ Although published as a War Department Field Manual, it was only 14 pages long. The document looked more like a pamphlet. Yet, it carried the weight of a document 1,000 times its size. The revelations put forth in this tiny document was that, at last—land and air were equals!⁴⁵ This field manual formalized air doctrine. Air superiority was the first priority.⁴⁶ No longer would air forces come under the command and control of ground commanders. Strategic bombardment forces would be used to strike the enemy nation. The number one mission of tactical air forces was air superiority and to participate in a combined air ground effort to support ground forces in the battle area.⁴⁷ The significance of the document can not be overstated. Achieving parity with the ground forces was the first step. Unfortunately, it took a world war to complete this first phase.

Summary

The question remains, how well were the three propositions proven in this chapter? The first: the US entered WWII with a strategic bombardment doctrine based on faulty assumptions that were not fully operationally tested and validated. The bombardment doctrine was not proven during WWI. During the inter-war years, the questionable results of the Ohio maneuvers justly prove this point. The results were flawed. The “favorable” judges established unrealistic exercise rules that virtually guaranteed the

success of the bombers. The results of the Ohio maneuvers were validated and sold as, the foundation of the strategic bombardment campaign...all based on invalid data...or at the very least, questionable results. Proposition number two: US entered WWII with airpower doctrine that did not fully integrate potential tools, tactics, techniques, and procedures (TTTP). One of the major inhibitors that precluded successful integration of warfighting TTTP, (fighter/bomber composite team), were the lack of flying resources. Not just the lack of aircraft, but the lack of the right types of aircraft. Available equipment drove employment concepts. Range, bombload, and fighter escort range limitations dictated how these resources would be employed. Number three: blind loyalty to the dogmatic belief that the bomber will always get through to the target. Blind loyalty to the bombardment doctrine precluded open investigation of alternative solutions. Prominent leaders at the ACTS created a self-fulfilling prophecy. We know the bomber will always get through—then exercises are designed to showcase the bombers capability, possibly due to an over zealous attempt to sell airpower. I question if there were ever any serious attempts by ACTS personnel to freely, openly, and aggressively pursue the operational concept of composite fighter/bomber operations. If the pros from ACTS did not pursue a radical new operations concept, and the leading airpower thinkers of the time were all proponents of strategic bombardment; then I submit, they were destined for the failures they experienced through the 1943/1944 period. We are very fortunate that the axis powers suffered even greater setbacks.

Notes

¹ Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (1942; new imprint, Washington D.C.: Office of Air Force History, 1983), 9, 20.

Notes

² William Mitchell, *Winged Defense, The Development and Possibilities of Modern Air Power—Economic and Military* (New York and London: The Knickerbocker Press, 1925), 29.

³ Dr. Thomas H. Greer, *The Development of Air doctrine in the Army Air Arm 1917-1941* (Maxwell AFB, AL: USAF Historical Division, Research Studies Institute, Air University, 1955: Washington, D.C., 1985 New imprint), 14.

⁴ DeWitt S. Copp, *A Few Great Captains* (New York: Doubleday & Company, Inc. 1980), 15.

⁵ Greer, 9.

⁶ Ibid., 10.

⁷ Ibid., 11.

⁸ Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960* (Maxwell Air Force Base, AL: Air University Press, 1989), 24.

⁹ Robin Higham, *Air Power A Concise History* (New York: St. Martins Press, 1972), 69.

¹⁰ Greer, 11.

¹¹ Ibid., 11.

¹² Ibid., 11.

¹³ Ibid., 11.

¹⁴ Mitchell, 5.

¹⁵ Ibid., 9.

¹⁶ Ibid., 9.

¹⁷ Ibid., 199.

¹⁸ Ibid., 10-19.

¹⁹ Ibid., 112.

²⁰ Ibid., 19.

²¹ Ibid., 19, 113.

²² Ibid., 164-166.

²³ Ibid., 171.

²⁴ Haywood S. Hansell, Jr. Major General USAF (Ret), *The Air Plan That Defeated Hitler* (Atlanta GA: Higgins-McArthur/Longino & Porter, Inc., 1972), 12.

²⁵ Ibid.12, 19.

²⁶ Ibid., 19.

²⁷ Ibid., 22.

²⁸ Futrell, 64.

²⁹ Ibid.

³⁰ Ibid.

³¹ Ibid.

³² John F. Shiner, *The United States Air Force General Histories, Foulois and the U.S. Army Air Corps 1931-1935* (Washington D.C.: U.S. Government Printing Office, 1983), 43.

³³ Ibid., 75.

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³⁴ Futrell, 80.

³⁵ Ibid.

³⁶ Ibid., 82-83.

³⁷ Ibid., 82-83.

³⁸ Ibid., 82-83.

³⁹ Greer, 37.

⁴⁰ Higham, 72-73.

⁴¹ _____, *The United States Strategic Bombing Surveys* (1945; new imprint, Maxwell Air Force Base, AL; Air University Press, 1987), 37-39.

⁴² Ibid.

⁴³ Ibid.

⁴⁴ War Department Field Manual 100-20, *Command and Employment of Air Power*, July 1943, (Washington, D.C.: Government Printing Office, 1944), 1-11.

⁴⁵ Ibid., 1.

⁴⁶ Ibid., 1-2.

⁴⁷ Ibid., 1-11.

Chapter 2

In Search of Doctrine

Introduction

In November 1945, General Arnold presented his final report to the Secretary of War. After a distinguished career in which he was a key player in building the world's largest and most respected Air Force, General Arnold:

Warned against complacency...national safety would be endangered by an Air Force whose doctrine and techniques are tied solely to the equipment and processes of the moment. Present equipment is but a step in progress, and any Air Force which does not keep its doctrines ahead of its equipment, and its vision far into the future, can only delude the nation into a false sense of security...the basic planning, development, organization and training of the Air Force must be well rounded, covering every modern means of waging air war, and the techniques of employing such means must be continuously developed and kept up to date. The Air Force doctrines likewise must be flexible at all times and entirely uninhibited by tradition.¹

General Arnold's advice in 1945 was right on target. It is not surprising that his advice is equally as valid today as it was in 1945. One of the greatest current challenges facing the U.S. Air Force is our search for doctrine. Is the Air Force Doctrine process broken? If it is broken, is it beyond repair? Much of this challenge is tied to our search for relevance in an ever changing world. The historical turf battles between the services have done much to shape what each service has become. The reality is that the debate has

been about roles and missions and each services share of the defense budget. Like it or not; each service is defined to a large extent, by the tools of their trade. General Arnold challenged all those that followed him to be visionary thinkers, defining and updating our doctrine to ensure that doctrine drives the acquisition process. However, before we can discuss doctrine, we must first define the term; the current *Air Force Manual 1-1, Basic Aerospace Doctrine of the United States Air Force* defines doctrine as:

what we hold true about aerospace power and the best way to do the job in the Air Force...what we have learned about aerospace power and its application since the dawn of powered flight...a guide for the exercise of professional judgment rather than a set of rules to be followed blindly...the standard against which to measure our efforts...doctrine should be alive—growing, evolving, and maturing...this is an airman's doctrine—written by airpower scholars for use by airpower practitioners.²

Overview

In this chapter I will trace the history of Air Force Doctrine development since World War II (WWII). I did not address each nuance of every revision of the Air Force Doctrine Manual. However, this paper does highlight some of the more significant issues and challenges associated with both, the doctrine development process, and types of Air Force Doctrine. Next, I present a proposed model for consideration that establishes a doctrine development process. I then look at some mission employment concepts with doctrinal overtones. A discussion follows that offers some recommendations for sweeping changes to prepare the United States Air force to meet the challenges of the next millennium.

Background

Doctrine—In The Beginning

The need for effective doctrine is well documented in Robert Frank Futrell's *Ideas, Concepts, Doctrine; Basic Thinking in the United States Air Force 1907-1960 [vol. I], 1961-1984 [vol. II]*. An early example was on 3 March 1943, Colonel Charles G. Williamson, Chief of the Bombardment Division offered the following comment:

In military matters, especially those of the magnitude of the operations of the present war, where mistakes and inconsistencies cost thousands of lives and millions of man-hours, it is all the more important that there be clearly expressed guiding principles which are clearly understood by all planners, as well as by all who are charged with the handling of the forces in the field.³

This early observation defined the need for a single integrated airpower doctrine. Colonel Williamson saw the need for an effective set of principles to guide everyone in the chain of command to ensure our forces would be successful on the battlefield. The United States Air Force struggle to define doctrine is now, as it was then, a never-ending challenge. The correct method to develop doctrine has been debated within the Air Force for decades. The June 1946 Air University (AU) mission summary stated “The Air University reviews, revises, and prepares publication of Army Air Force (AAF) basic doctrine. . . develops basic doctrines and concepts for the employment of airpower.”⁴ The Air University plan for achieving academic airpower excellence was to create three schools; “the Air War College, the Air Command and Staff School, and the Air Tactical School.”⁵ The governing body for curriculum development, the Faculty Board, directed that official AAF policies would be provided for students to review; however, they would not be binding. Despite this open academic approach, the “basic doctrine would be the

foundation of the schools curriculum....all students would be made aware of the AU core belief that the ultimate objective of airpower is to force the capitulation of an enemy by air action applied directly against the vital points of its national structure...this may not at any given time be primary in importance, but it is the ultimate objective.”⁶ In establishing Air University as the functional developer of doctrine, General Spaatz did not give AU carte blanche to divorce the schools from current doctrine being employed by the various commands in the AAF, yet there was an expectation that Air University would take the lead in the doctrine project. In May 1946, Brigadier General Griswold, Deputy Chief of Staff for Operations, stated that:

The Air Force should develop an airpower field manual which will establish the place of airpower in the armed forces and define our policies, doctrines, strategy and tactics....The theory or strategy of airpower, particularly strategic bombing, has never been adequately put on paper...A strong and logical framework must be developed from which can be provided appropriate manuals for the provisional education of officers of all ranks in all of the armed forces, and policies to guide our public relations and dealings with Congress.⁷

The independence of airpower was declared in War Department Field Manual 100-20 in 1943.⁸ However, Griswold felt that FM 100-20 was outdated by 1946 and needed to be replaced. While desirable, the political climate in 1946 did not make revising 100-20 a possibility. The Air Staff did not want to pursue anything that might disrupt expected post war unification of the armed forces.⁹ General Arnold had released an advocacy paper in early 1944 that laid the ground work for reorganization of the American military after the war. His proposal was very similar to the structure we have today. The Departments of War and Navy would be eliminated and a single Secretary of War would lead the military with four Assistant Secretaries. In this plan, the Air Force

would be a separate but equal service. General Arnold pointed out that the great success achieved during WWII by the American military was because they were unified in action. He felt that the unification of the services, which also meant a separate Air Force, would best serve the United States military and the nation.¹⁰

An Independent Air Force

The passage of the National Security Act in 1947 established the Air Force and removed the political risk associated with revising FM 100-20. Now as an independent Air Force, plans were made to move forward on the development of official Air Force Doctrine. In August 1947, representatives from Air University, Air Defense Command, Tactical Air Command, and Strategic Air Command gathered to outline the “Air Force position on air defense procedures, doctrine and organization.”¹¹ Air University was tasked to overhaul FM 100-20 and develop a set of doctrine publications. Two seminars from Air War College were selected to meet this challenge. The seminars’ findings indicated that Army Field Manuals were too inflexible and did not provide adequate coverage. Developing doctrine—like many other transitional challenges, required radical new thinking. The new Air Force needed to stand on its own, totally independent from the Army, both in form and fashion. The students recommended the Navy model be followed to develop Navy type air employment instructions.¹² The mood in the newly formed Air Force was to benchmark against the Navy for variation to the Army model. The last thing the Air Force wanted to do was to develop a new independent Air Force that resembled the old Army Air Force. The Air War College students recommended air instructions be developed that addressed three basic categories. “First, a basic book on airpower; second, an outline of the fundamental principles and basic doctrines; and third,

a section that would address operations, tactics, and techniques.”¹³ The recommendations were accepted, with minor modifications. Specifically, “the instructions were expanded to include other functional areas to cover administrative issues, logistics, communications, intelligence and other unique categories.”¹⁴ The final AU recommendations incorporated all categories into three basic volumes. “*Volume one* remained *Airpower*, *volume two* was the *Commander’s Guide*, which included seven separate books to cover, operations, strategic applications, joint operations, air defense operations, air transport, air reconnaissance, and special activities...*volume three* was the *Group and Squadron Commander’s Handbook* which included six books covering, group and squadron tactics and techniques of bombardment, fighters, reconnaissance, air transport, and special air units.”¹⁵ One unique aspect to this endeavor was that the senior Air Force military unit in any given area, would be responsible for doctrine development in their area of responsibility.¹⁶

Air Staff review of the first effort to produce doctrine was not well received. The manual produced was found “to be discursive and defensive...lengthy and cumbersome...containing too much inessential references to WWII...to include controversial statements that did not contribute to an enunciation of doctrine.”¹⁷ One of the problems with development of doctrine was the confusion over the definition of terms. Air War College student feedback indicated that they “had often been confused by an almost synonymous usage of the words concept, doctrine, strategy and policy.”¹⁸

Fighter Bomber Conflict

The issue of semantics and confusing terms had been a recurring problem in attempts to define and implement doctrine. Part of the Air Force problem was with our very

foundation. Historically, Air Force personnel were more prone to identify with a specific platform—a specific airplane type, rather than a set of principles or warfighting concepts.¹⁹ From our earliest days at the Air Corps Tactical School, the debate was not just between strategic bombing and pursuit tactics, the issue was really, the bomber versus the fighter.²⁰ This debate did not go away with the end of the war. While long range fighter escorts directly contributed to strategic bombing success in the latter stages of WWII, the dawn of the jet age promised many new opportunities and challenges.

Fighter escort concepts carried forward from WWII did not sit well with the fighter community moving into the jet age. The employment of jet fighters for bomber escort was challenged in a 10 August 1948 study by Colonel William W. Momyer, Tactical Air Command's Director of Plans. Colonel Momyer felt that jet fighter escort was “an obsolete concept of the last war.”²¹ This type of rivalry between different branches within the Air Force was counterproductive to the cause of airpower. Instead of developing concepts of mutual support and combat employment, the strategic and tactical community engaged in this senseless debate. As Carl Builder points out in the *Icarus Syndrome*, aviators were arguing over which tools would be used, rather than how best to maximize the synergistic potential of airpower.²² This conflict of airpower ideologies has been a divisive issue throughout our history. We were blinded to the full potential of airpower because the word strategic conjured up visions of long range, four engine bombers; and tactical was equated to fighter or pursuit aircraft. Frank Futrell cites numerous examples that show many of our early airpower theorists were strong believers in strategic bombardment.²³ The attraction to strategic bombing was great. This was a mission that neither the Army nor the Navy could accomplish. Airpower pioneers

realized that if the Army Air Force proved successful in strategic bombing it would greatly strengthen their argument for a separate service. Success on one front was achieved in 1943 when *Army Field Manual (FM) 100-20* clearly stated that the ground and air components were “co-equal and interdependent forces; [and that] gaining of air superiority is the first requirement for the success of any major land operation.”²⁴

The First Doctrine Manual

FM 100-20 remained the only formal document to address air operations until, finally in April 1953, *Air Force Manual 1-2, United States Air Force Basic Doctrine*, was published. The five year development process was unacceptable. Major General Barker, Deputy Commander for Air University, felt that the extensive rewrites resulted in no significant doctrinal changes. Air Force Deputy Chief of Staff, Lieutenant General White “...agreed that far too much time was spent in seeking a document that would be palatable to all.”²⁵ Considering the great length of time required to produce the first doctrine manual, he estimated it would take 15-20 years to complete the work required to produce the entire doctrine series.²⁶ Considering this feedback, changes were made which allowed AU to maintain more control over the development of doctrine manuals. Future Air Staff review was limited to issues of “substance only.”²⁷

Roles & Missions

Yet, the debate over Air Force doctrine was still inextricably tied to the roles and missions discussions and had significant influence over the acquisition process. In 1950, the Joint Chiefs of Staff tasked the Air Force to conduct three primary missions. First, strategic bombing; second, United States Air Defense; and third, tactical support for

surfaces forces. The Air Force Chief of Staff, General Vandenberg, indicated that “...although those three jobs seemed pegged to different objectives, it is impossible to separate them in practice because—and this is a principle ignored too often—airpower is indivisible.”²⁸ The Air Force felt strongly about their mission relationships, a new plan was developed by Strategic Air Command (SAC) to accomplish all three missions. The concept for war called for SAC to first destroy “vital elements of the Soviet war-making capability, blunting Soviet capability to deliver an atomic offensive, and retarding the Soviet ground advances into Europe.”²⁹ While SAC accepted all three missions, General LeMay questioned the viability of SAC Bombers being employed against tactical targets.³⁰ Another challenge was the way the Air Force was organized. The military drawdown after WWII and the increasing Soviet military threat against North America forced significant changes in the U.S. military. Changes resulted in greater emphasis being placed on SAC and less on conventional and air defense forces. Air Defense and Tactical Air Commands were subordinated to secondary level commands and placed under the Continental Air Command in 1948.³¹ This reorganization did not sit well with U.S. Army leadership. They felt that the Air Force was not living up to their commitment to provide air support for the Army.³² In 1950, they argued that a single aircraft would not be able to conduct supersonic operations against Soviet jet bombers and still be capable of low speed, long endurance, close air support for the Army.³³ They also believed air support should be subordinated to ground commanders. In addition, they wanted design input to help determine characteristics of future aircraft fielded to support ground forces.³⁴

The Arms Race

In 1951, the massive Soviet military build up was the driving force in the airpower debate; how would the United States respond. Arguing for limited ground support to be provided in defense of Europe, General Spaatz said that “The prevailing ‘wall of flesh strategy’ philosophy in Washington today will not motivate the Europeans to build up their strength...the Soviet Union had built up a 10-to-1 superiority in jet fighters over the United States...we are losing the first and crucial battle in any possible war with Russia—the battle for command of the air.”³⁵ Senator Lodge, in July 1951, said “the great debate over dispatch of American ground divisions to Europe produced many reasons for the expansion of American airpower.”³⁶ The 1952 defense budget allowed an increase in all four services. The Army went from 18 to 20 combat divisions, the Navy continued with construction of its large aircraft carrier, the USS Forrestal, and began construction on a second big deck carrier. Additionally, the Navy began construction of a new nuclear submarine. The Marine Corps got a third division and a third air wing. The Air Force achieved 95 wings and placed orders for 6,944 aircraft. With the new build up; airpower was given priority. Both SAC and TAC would gain new forces. Included in new aircraft buys were B-52As, and RB-52s, B-57s and RB-57s. Jet fighters ordered by the Air Force included: F-84s, F-86s, F-89s, F-94s and F-100s.³⁷ The great motivation for the U.S. military build up was the Soviet Union’s 20,000 front line aircraft and another 20,000 in the reserves. General of the Army Bradley said, “in spite of the fact that airpower alone can never be decisive in total war, the air battle must be won if a war is to be won.”³⁸ The JCS stabilized the Army build up at 20 divisions; the Navy at 409

ships; the Marines at three divisions and three air wings. However, Air Force growth continued with funding for 143 wings (126 combat and 17 troop carrier wings).³⁹

Weapons And Doctrine—Do They Match?

Unfortunately, with this great American military build up; something was lost. General Arnold's challenge to ensure that doctrine led our technology was not being met.

In the 1950s, Eugene Zuckert, who later became the Air Force Secretary said:

Frankly, I do not see quite the same degree of inventiveness in our concepts and doctrine that we have demonstrated in technology and in military adaptation to technological change. . . We can't afford to let military science, which governs the use of weapons, fall behind the physical sciences that create those weapons. More than that, military science, which includes doctrine, ideally should stay well ahead of technology to give technology meaningful direction.⁴⁰

Eugene Zuckert's 1950's airpower thoughts led to 1960's actions. As Secretary of the Air Force in 1961, it is no surprise that he achieved closure on issues he felt strongly about a decade earlier. *Air Force Regulation 1-1, Responsibilities for Doctrine Development*, was published on 20 March 1963. AFR 1-1 clearly identified the Headquarters Air Force, Deputy Chief of Staff for Plans, as the office of primary responsibility for developing basic Air Force doctrine, operational doctrine, and unified doctrine.⁴¹ In August 1964 the new *AFM 1-1, United States Air Force Basic Doctrine*, was published; it stated, "...basic doctrine evolves through the continuing analysis and testing of military operations in the light of national objectives and the changing military environment."⁴² A new section was added in AFM 1-1 that provided amplifying guidance on basic aerospace doctrine. The new doctrine manual established key principles for aerospace forces; and was the foundation for employment, tactics, techniques and procedures for employment of aerospace forces.⁴³

Doctrine Office And Army Cooperation

The importance of Air Force doctrine was reinforced when, on 1 July 1966, the Directorate of Doctrine, Concepts, and Objectives (HQ USAF/XOD) was established. Their mission was: “To do hard thinking about the Air Force of the future...because of a continuing need for original, creative thought to help reason and guide the way to the future.”⁴⁴ The new directorate included an aerospace doctrine division, a concepts and objectives branch, and an inter-service liaison section.⁴⁵ The major problem in the directorate was that they were not allowed to do the job they had been hired to accomplish. Instead, they were fire-fighters. They were relegated to the status of just another air staff directorate with available manpower to also work hot button issues. Lieutenant General Loving, who had served in XOD as a staff officer, branch chief, and then as the division director said: “Papers would come to be coordinated, and we would look at them from a doctrine viewpoint. Fundamentally, we were defenders of the faith; that was one aspect of the job, to try to defend our roles and missions in a rational way that would serve the Air Force and the country well.”⁴⁶ In response to support requested by the Army, the doctrine directorate conducted an analysis of close air support requirements. In a remarkable move toward jointness, the 1966 analysis led to the development of an “inexpensive, rugged, highly specialized close-air-support aircraft, the A-X, which later became the A-10.”⁴⁷ The A-10 program led to greater cooperation between the Army and the Air Force. The Joint Chiefs of Staff supported these activities and directed the development of joint doctrine between the Air Force and the other services. Ten years later, the Air Force published AFM 1-3, *Doctrine and Procedures for Airspace Control in the Combat Zone*.⁴⁸

Another Revision....New Focus

The 1963/64 version of AFM 1-1 was being revised in 1967. However, the 1967 version was not published until 1971. The excessive delay was due to a desire to include lessons learned from the 1967 Israeli war, the Soviet invasion of Czechoslovakia in 1968, and operations in Vietnam.⁴⁹ An analysis, conducted by an Air Command and Staff College group, found that there were few airpower principles enunciated in the 1971 version of AFM 1-1. Instead, the manual was focused on roles and missions.⁵⁰ The new Director of the Air Force Doctrine Division in 1971 was not satisfied that the process to revise the manual took seven years and required 27 drafts. In the span of the normal Air Staff Office, there could have been as many as two or three turnovers of personnel involved with this critical document. This lack of focus reinforced comments by other doctrine division personnel that they were employed, just like another staff directorate, tasked to put out brush fires. The one positive aspect of the review process was the requirement for senior Air Force leadership to review Air Force Doctrine before it was published.⁵¹ The next revision of AFM 1-1 was published in January 1975. The amount of time to publish the new version was cut almost in half from the previous manual. The 1974/5 version included, for the first time, a section on the role of the Air Force in Space. The 1974/5 manual was titled, *Aerospace Doctrine: United States Air Force Basic Doctrine*. The manual included doctrine sections on basic, operational, functional, joint, and for the first time, combined doctrine. The foreword by General Jones read:

USAF Basic doctrine is derived from knowledge gained through experience, study, analysis and test. It evolves from changing military environments, concepts, and technology; and through continuing analysis of military operations, national objectives and policy. This evolution must

be a continuing process so that basic doctrine can remain a useful guide for the conduct of aerospace operations.⁵²

While the 1974/75 version was produced in half the time as the previous version, personnel working in the Doctrine Directorate indicated that they had the same staffing challenges as their predecessors. They too were “fire fighters” with little time to reflect on the larger strategic issues one would expect to be worked by the Doctrine Directorate.⁵³

After Thirty Years—What Process?

Prior to the next version of AFM 1-1 being published in 1979, several issues were raised about the overall process. There were periods when up to seven years would lapse between versions, the average time between revisions was approximately three and one half years. The AFM 1- series addressed basic doctrine; while the AFM 2- series addressed operational doctrine; and, the AFM 3- series addressed mission employment tactics. The question asked was since AFM 1-1 was revised periodically, why did the 2- and 3- series languish un-revised? The answer suggested that there were little, if any ties between the basic doctrine manual and subordinate documents.⁵⁴ An additional comment provided by Students at Air Command and Staff College indicated that, “AFM 1-1 was trying to be all things to all readers.”⁵⁵ Feedback from the ACSC students convinced the Doctrine Directorate that “there are simply no handles on doctrine.”⁵⁶ In response to these inputs, another study of doctrine was completed. This study included both students from Air University and Captain Ehrhart of the Air Force Academy. Captain Ehrhart’s proposal to resolve the enigmatic issue of doctrine was to define doctrine more succinctly. He submitted that: “Air Force doctrine is the body of enduring principles, the

general truths and accepted assumptions, which provide guidance and a sense of direction on the most effective way to develop, deploy, and employ airpower. It should not encompass either political influences or specific instructions on the execution of these principles.”⁵⁷ His detailed analysis of Air Force Doctrinal indicated:

A fundamental problem with Air Force doctrine is the absence of any real consensus as to what doctrine is and just what it is supposed to do. We want doctrine to reveal not only the capabilities of air forces but also to offer guidance on how best to use these capabilities. We demand that doctrine be both enduring and flexible, that it be valid over time yet responsible to change. We look to doctrine to provide guidance to Air Force personnel, while insisting that it remain open to interpretation. We want it to provide direction, yet not be too restrictive in its direction. We expect doctrine to guide research and development while at the same time it adjusts to technological innovations. And we insist that doctrine set out fundamental principles for the employment of air forces, while demanding it remain subordinate to national policy. . . . By trying to stretch a single term, “doctrine,” to accommodate all things, we wind up with an amorphous concept that falls short in all areas. This criticism is not merely quibbling with semantics: The inability of Air Force people to understand the essence and purpose of doctrine is largely the result of trying to include too much under one umbrella word.⁵⁸

The 1979 version of AFM 1-1 was not well received. Many people perceived the document to be an attempt to tell the Air Force story—this is a who we are document, including drawings that were more appropriate to be included in a “picture book,” as the 1979 version was soon labeled. The focus of the 1979 version was widely questioned. Several leading military scholars were concerned about Air Force priorities in the new doctrine manual. Dr. Williamson Murray, a renowned military affairs scholar and author of, *A Tale of Two Doctrines: The Luftwaffe’s Conduct of the Air War and the USAF’s Manual 1-1* wrote: “...when a nation’s military services become more concerned with deterrence than with their capability to fight, their real ability to deter comes into question.”⁵⁹ During the cold war, major emphasis in the Air Force was placed on the

strategic mission and nuclear deterrence. This changed after Vietnam; the new AFM 1-1 renewed the importance of conventional warfare⁶⁰

Warfighting Is Back

AFM 1-1 was next published on 16 March 1984. This version was directed more at warfighting than addressing the roles and mission of the Air Force. A new chapter, “Employing Aerospace Forces, introduced the principles of war: objectives, offensive, surprise, security, mass, economy of force, maneuver, timing and tempo, unity of command, simplicity, logistics, and cohesion.”⁶¹ The last paragraph of Annex A summarized the development of AFM 1-1.

Since 1943, several fundamental beliefs have remained imbedded in Air force doctrine. Airpower can exploit speed, range, and flexibility, better than land and seas forces, and therefore, it must be allowed to operate independently of these forces. These characteristics are most fully realized when airpower is controlled centrally but executed decentrally. The principal missions of airpower have evolved over the years and reflect what airpower does best. Although priorities in their application have shifted with changes in national policy, the beliefs about the proper employment of airpower have remained fundamentally constant in the face of profound changes in technology, strategy, and international relations.⁶²

Current Doctrine

The tenth and current version of AFM 1-1 was published in March 1992 as a two volume set. Volume I is only 20 pages in length.⁶³ Volume II is a collection of essays referenced in Volume I. For example, in Chapter 1, Volume I, paragraph 1-1, War is defined as “a violent struggle between rival societies to attain competing political objectives.” At the end of paragraph 1-1 is a reference to Volume II, Essay A. The essay title is “*War, An Instrument of Policy*.”⁶⁴ The genius in designing two volumes is to provide a quick reference, easy to read version in Volume I, and an expanded version for

further study in Volume II. The problem is that not very many people ever refer to Volume II. An informal survey of fellow Air War College classmates indicate that few people felt both volumes were well read by the general Air Force populace. While statistical data to support this supposition is not available, the fear is that it may be a valid claim. More than one senior Air Force guest speaker at the Air War College, commented on the need for doctrine refinement in the Air Force. At one luncheon, the speaker indicated that members of our sister services can cite chapter and verse of their doctrine, while Air Force personnel seem at a loss for words when challenged to discuss Air Force doctrine. Unfortunately, the Air Force relationship with technology has often clouded our judgment and affected our ability to keep our focus on airpower rather than being distracted by the tools debate. Our sister services have been more effective in defining their scope. The Navy maxim, Maritime Strategy became From the Sea and then, Forward From the Sea. The Army concept was AirLand Battle, which is now Force XXI. Historically, the Air Force challenge has been the lack of this type of integrating vision.⁶⁵ However, in 1990 the Air Force made a significant move forward with a white paper titled, *Global Reach-Global Power*, which was later revised to *Global Engagement*.⁶⁶ While the Air Force is moving in the right direction, it will take more than a reengineered vision and a “Madison Avenue” catch phrase to get airpower doctrine back on track.

Doctrine: Strategic—Operational—Tactical

The general feeling is that AFM 1-1 meets the Air Force needs for strategic level doctrine, and the Multi-Command Manual 3- series satisfies our needs at the tactical level. However, the one area in need of development is operational level doctrine. Dr. James A. Mowbray concludes in an *Airpower Journal* Article, *Air Force Doctrine*

Problems, 1926 - Present, published in Winter, 1995, that “the Air Force must write operational doctrine that is accepted service-wide. The Air Force does not need another TACM 2-1 experience in which the service itself cannot agree on how it is to do its mission.”⁶⁷ This conflict may explain why Air Force Manual 2-1, *Tactical Air Operations*, has not been revised since it was introduced in 1969.⁶⁸ Some suggest the absence of operational level doctrine is related to a lack of understanding of operational art by Air Force Officers. Lieutenant Colonel Price Bingham pointed out in his Winter 1991, *Airpower Journal* Article, *Air Power in Desert Storm and the Need for Doctrine Change* that “before the Gulf War, some Air Force officers seemed to believe that the sole purpose of theater air power was to support the ground commander’s scheme of maneuver.”⁶⁹ The question remains; did the joint world learn the same lessons from Desert Storm? Some would argue that the forty three day air campaign, set the standard for all future wars to be measured against. Has the Army Training and Doctrine Command (TRADOC) initiated courses on land warfare scheme and maneuver in support of the air component? Has TRADOC even acknowledged the success achieved by airpower in shaping the battlefield? Much has been written about the effectiveness of airpower during Desert Storm. Lieutenant Colonel Bingham suggests that “we learned an inexpensive lesson in Desert Storm; that our current doctrine needs to be revised to take advantage of the airpower impact on the battlefield.”⁷⁰ While this may be a valid point, we need to approach this issue with due caution. The Army Air Force struggled all through WWII trying to prove that daylight strategic bombing would be the key to defeating Germany; we should not make the same mistake. Just before he retired in 1994, then Air Force Chief of Staff, General McPeak, indicated that the Air Force should

control the deep battle. This move did little to endear the Air Force to our sister service. The perception of General McPeak's plan is that it would mean that Army long range artillery and patriot batteries would remain silent and Army attack aviation would have little room to maneuver.⁷¹ General McPeak's successor was less inclined to tell our sister services to stay home while the Air Force wins the nation's wars.

New Chief—New Vision

In his April 1996 address to the Air Force Air and Space Doctrine Symposium, the new Air Force Chief of Staff, General Ronald R. Fogleman stated that:

Doctrine provides a common foundation for us to use in employing our forces in peace, war, and the numerous gray areas in between....Our primary audience for doctrine ought to be the war fighters....Air Force doctrine should provide an integrating framework to tie together the various elements of the Air force team, to show how these elements work together, and to provide a basis for integrating airpower with other forms of combat power in joint operations....Doctrine may support "why" we have certain weapon platforms, but its real value lies in providing our people a coherent framework for employing airpower as a team.⁷²

Speaking directly to the issue of joint interoperability, General Fogleman indicated:

We cannot let our enthusiasm for our primary mediums of operations blind us to the advantages that can be gained by using airpower in support of land and naval component objectives....Not enough airmen have a basic concept of what's required to integrate air and space sensors; command and control; Army aviation and [the] Army tactical missile system; Navy and Marine strike aircraft and cruise missiles; our own fighters, bombers, and tankers. The ultimate goal of our doctrine should be the development of an airman's perspective on joint warfare and national security issues-not just among our generals, but among all airmen in all specialties.⁷³

At the strategic level, our mid- to senior-level leaders need to understand potential political implications of various airpower employment options....At the operational level, our doctrine should provide the framework for theater air employment to include how we integrate the effects of Army, Navy, and Marine systems with our own combat assets....I think the MCM 3-1 series provides a solid foundation for employment of aircraft at the small-unit level....However, when you look

at the tactical, operational, and strategic level doctrine being spread geographically and functionally throughout the Air Force, we've got a continuing challenge to ensure our doctrine remains consistent within our own service, not to mention staying consistent with joint doctrine.⁷⁴

Doctrine In Search Of A Process

Part of the problem with Air Force doctrine is that in the past we have not had a standardized process for its development. Over the years we have had different offices tasked for doctrine development. Some were located at the Air Staff, tasked to develop doctrine, along with normal air staff duties. At other times, doctrine was written at other various locations, even being developed by each command for their operations. We have always had a review process for doctrine, but never a real methodical approach to developing doctrine.⁷⁵ There is hope with the establishment of the Air Force Doctrine Center at Maxwell AFB; this will all change. Being located adjacent to Air University will give the new Doctrine Center access to the best and brightest in the world. One of the most significant aspects of this relationship can be achieved with some forward thinking by the Doctrine Center; specifically, establishing a direct relationship with Air War College, Air Command and Staff College, and even Squadron Officer School. Not only will a pool of personnel be available to the Doctrine Center; but if engineered properly, they can tap into the genius that may rival the Air Corps Tactical School in the 1930s. The two greatest aspects that I see are; first, access to a multi-service brain trust; and second, the opportunity to pollinate young, and not so young, fertile minds with concepts of visionary doctrine. It would be best if the Doctrine Center does not close the doors on our sister services and international officers that attend Air University Schools. Neither the Air Force, nor America has a corner on visionary thinkers. Hopefully, the

new Doctrine Center will be allowed to do the work, for which they are being established; there are advantages to not being located in Washington D.C. Being co-located with Air University will solve two problems; the third challenge is developing a process for doctrine development. One possible solution is a plan developed by Colonel (Ret) Dennis Drew. In a 1995 Airpower Journal Article, *Inventing a Doctrine Process*. Colonel Drew recommends the development of a systematic intellectual approach to doctrine development:

A reasonable and proven outline for a systematic approach to the development of doctrine resides in the classic, structured steps of a research project: devise a research question; devise a research plan; gather the required data; analyze the data; in light of the data, formulate and evaluate potential answers to the research question; in light of the data, identify the best answer; and, finally, write and publish the research report.⁷⁶

Colonel Drew indicates that he would also add a couple of additional steps to this model to educate the force and apply the doctrine. While most will agree with Colonel Drew's concept, the one area where his model runs into a challenge is in educating the force and applying the doctrine outside of the formal review process. In his continuous improvement model, the last two steps would be ongoing, as is the entire process. However, the political budget implications and inter-service rivalry may be too great to overcome, unless the revision cycle is greatly reduced from the three and one half year average the current system provides.⁷⁷

New Doctrine Frontiers

The Air Force is making significant progress on our doctrine journey. Consolidating all Air Force Doctrine activities in a Doctrine Center located adjacent to Air University is a quantum leap forward that will be a highly successful move. This action is reminiscent

of the spirit of the Air Corps Tactical School. There is no better place and no better time in the Air Force history to begin this journey anew. We are approaching the end of the military drawdown with the last of the cuts expected to be finalized after the upcoming Quadrennial Defense Review. These changes will carry us into the next millennium. The change in international relationships brought about by the demise of the Soviet Union make this a more difficult world. Without a peer competitor, many suggest that the U.S. Military of the future needs to take on an expanding role to become the worlds' police officers. One such proponent of a new U.S. military role is Carl Builder.

Mr. Builder has long been an advocate of expanding the official role of the Air Force to include police-like operations. He argues that our current operations in Bosnia and Iraq are, in many ways, “constabulary” operations. The problem he has with our current operations is that we are still using our war fighting doctrine to conduct policing of a no fly zone. He has four recommendations for updating our doctrine and acquiring new systems to accomplish this mission. First, we need the ability to conduct an immediate surgical strike against heavy weapons fire without producing collateral damage. Second, we need an effective doctrine and weapons system to employ against aircraft flying slow at low altitudes. Third, we need the capability to conduct “non-lethal” riot control. Fourth, we need all weather ingress—egress systems for personnel and equipment, something larger and with longer legs than current helicopter technology. The synthesis of his argument is that our doctrine has become stale, that we need to think outside the box and apply the result to a law enforcement mission.⁷⁸

There is much to be said about Mr. Builder’s argument. However, the issue is not a blue suit, but a joint issue. We are enforcing two no fly zones in Iraq and keeping

warring factions apart in Bosnia. A guiding principle in the military is to train for the worst case scenario, full scale war; with the expectation that we should be able to handle any thing less. Mr. Builder was not the first to address this issue. In the process of advocating a single military department, General Arnold's November 1945 report to the Secretary of War, indicated that the military would "establish, develop, maintain, and direct forces required for *PEACE ENFORCEMENT* and for national security...[and] rapid expansion in case of all-out-war."⁷⁹ There would seem to be a sufficient argument for the United States to develop doctrine for all potential challenges across the spectrum of violence. However, we have been down this road before. Many say the misapplication of military force was proven ineffective in Vietnam, where we fought the wrong war with the wrong tools against the wrong enemy.

In today's world, the U.S. Military does not have a peer competitor vying for the hearts and minds of fledging democracies. In addition, we continue to conduct peacemaking or peacekeeping operations. It would stand to reason that expanding our current doctrine and developing tactics, techniques, and procedures for these types of missions would be wise. The problem is that these types of missions do not seem to support large military budgets. No one wants to sign on to support a \$250 billion military budget to keep peace in Haiti. The only way we can continue our current path is to buy systems that support major regional contingencies; and then, use those systems and personnel as best we can to police the streets of Mogadishu.

Discussion

The Air Force has long struggled with the issue of defining, not only airpower doctrine, but the very unifying principles required to justify a separate Air Force. I submit that we have spent the last fifty years waging a war we had already won. Air Force leaders may not have been insecure about the stability of our independence, yet I suspect they were nervous. However, when you consider the roles and missions debates, we progressed beyond the fighter bomber debate which started as an internal struggle and ended up being a national strategic issue as a result of the atomic bomb.

The Air Force has actually been fighting the same battle as our sister services—each year seeking relevance and validation via the defense budgeting process. When all is said and done, the perennial struggle for as big a share of the Department of Defense budget as possible, will never end. By the very nature of our existence, all branches of the service want the same thing; the best equipment and the brightest people our nation can provide. Our goals are the same. We all want to ensure America is always free; we are all willing to fight and die for that cause.

No one should confuse inter-service rivalry with lack of support for our sister services. What we need to do as the only full service, full time Air Force; is to meet the Chief's challenge. We should put our differences aside, cease the bickering and think outside the box. How can we combine the talents and capabilities of each service to achieve the best force packaging to defeat any enemy, any time, any where? This all starts with our own operational foundation. You cannot build onto a foundation that has not yet been established. At the O-3 level, we should begin integration with our sister services—beyond the operational exercises we now conduct. The next step is to take

advantage of the opportunity being created here at Air University. During the mentoring program with both Squadron Officer School and Air Command and Staff College students, the one recurring theme was—they are spending far too much time on what they perceive to be low level priorities and far too little time on the most important aspects of being a warrior.

New Opportunities

My proposal is to completely overhaul the curriculum for all three schools to incorporate a, back-to-basics program on being an “**AIRMAN!**” No one should ever graduate from SOS, ACSC, or AWC, without a thorough understanding of our airpower history; where we were, where we are, and where we are going. Each and every student should be steeped in airpower doctrine. The current Air University approach results in students being exposed to information that is an inch deep and a mile wide. I realize there are competing challenges for a limited number of student contact hours and only so much material can be covered. The mission of each department is critical; everyone has their requirements. I agree everything that we have been taught has been important. The education we have received is priceless. Yet, there is still a deficiency. What I am addressing is not an issue that Air University alone can solve. This is an issue that will only be resolved for the Air Force with the combined efforts of the Doctrine Center and the Air University. The number one priority for the premier schools in the Air Force should be to teach airpower. The faculty will say that we are spending a large percentage of academic time on airpower already, and this is a true statement. However, if you evaluate what we really are working on, you would realize there is very little time for

serious reflective thought and “outside the box—visionary thinking.” For me, I was able to clear this hurdle by selecting as two of my elective courses, the pre- and post- 1945 Strategy, Doctrine, and Airpower courses. The greatest challenge in this process is that there are so many outstanding courses to choose from—you just can not register for all the classes you are interested in taking. Again, I realize everything taught is critical—nothing could be reduced. However, the focus of the academic program should be refined. I suggest that the curriculum suffers from the same affliction that challenges Air Force Doctrine—we are trying to be all things to all people. When you do that, everyone usually gets short changed.

The Secret Ingredient

The great opportunity laying at the Air University doorstep is the second part of my proposal. I recommend that Air University develop an integrated program with the Doctrine Center for all professional military education programs. Some of the academic challenges—test, book reviews, papers, etc., could be revised, or eliminated in favor of airpower research projects. The Doctrine Center should host a quarterly airpower doctrine symposium where students could present their research to the audience, composed of SOS, ACSC, AWC, and Doctrine Center personnel. This exercise will ensure all students are building a strong foundation in airpower doctrine; and yet, will be developing research techniques and refining their briefing skills required at senior staff positions. I envisage an annual Air Force level Airpower Doctrine Symposium where the best of the forward thinking research projects would be presented to the senior Air Force leadership. If we can bring over 2,000 people to Montgomery Alabama each year

for a Quality Symposium, surely we can do the same for airpower. I also recommend that the annual symposium not be held at a time when Air University students could not attend, which is the challenge presented by the current annual Air Force Doctrine Symposium schedule. Achieving this level of airpower thinking would allow Air University students to analyze and evaluate outside the box thinking. This process would also expose the greatest new minds to the senior Air Force leadership, and in turn, would allow a more personal opportunity for today's leaders to shape the future of the Air Force.

Step two of this process would be to establish quarterly working groups and an annual cross flow symposium between the Doctrine Centers in all four branches of the military. The synergistic potential of the mental gymnastics in this type of "Doctrine Olympics" is unlimited. This would be the ultimate in benchmarking; an academic equivalent to gathering the best from Fighter Weapons School, Top Gun, Gunsmoke, William Tell, and other competitions to fly an expanded Green Flag.

Summary

The recommendations made in this paper are ambitious; costing both time and money. Yet, the benefit to future **AIRMEN** is beyond measure. This program would refocus the heart of the Air Force on the most important aspect of all that we do, all that we are and should be; preparing today's students for tomorrow's airpower leadership challenges. While many Air University personnel will say there is no slack in the program to add anything, I agree. However, I submit there is room to modify the current curriculum. This effort would have to begin slowly; it eventually would build up a significant head of steam, producing superior results.

My suggestions may appear to be radical. I suggest that radical thinking outside the box is exactly what we need to prepare today's students for the challenges in the next millennium. If not Air University—where? If not now—when? Who will be the leaders of tomorrow?

Notes

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⁴⁷ Ibid., 718.

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Chapter 3

The U.S. Air Force in the Next Millennium

As shown in previous chapters, in the early days of military aviation, men of great courage and vision attempted to establish a separate and independent Air Force. This was a Herculean task considering they had an uphill battle to fight against both the Army and Navy, as well as the majority of public officials. Airplanes were altogether too new a concept for the average person to support. Like the automobile before, the airplane needed to mature before it would be accepted as a full fledged member of either the civil or the military sector of society. The early visionaries, Mitchell, Douhet, Trenchard, all charted their own course toward fulfilling aviation's destiny. In the U.S. Army Air Corps, Brigadier General Billy Mitchell proved the worth of aerial bombing—and set in motion, a struggle that would beset airpower enthusiast for the next fifty years. Strategic bombing, a mission only aviators could accomplish, was for many—the ticket to an air corps, independent of both the Army and the Navy. Defining strategic bombardment as the doctrine and strategy of an independent Air Corps were one of the few times in our military history where American military doctrine was ahead of our technology.

In many cases, doctrine was rarely developed for weapons employment before forces were fielded. In the future, the doctrine and technology struggle will be one of our greatest challenges in building and equipping an Air Force for the 21st Century. The

dissolution of the Soviet Union and the expected peace dividend that should have followed the fall of the Berlin Wall have done much to shape the United States military of the next millennium. The constant struggle for each service's share of the defense budget has continued to drive management decisions. This is one of the main themes of this third chapter, a search for a defining concept for weapons acquisition to support a 21st Century Air Force. The debate is—what weapons systems do we need to face a peer or niche competitor in the next millennium? Could one draw conclusions of future needs based on the results of the Gulf War? Is the Gulf War relevant to this debate? What should the Air Force look like and be able to accomplish in the next Century? Do we need the F-22, the Joint Strike Fighter and the F-18E/F? Considering current aircraft systems, planned replacements and upgrades—what is the greatest Air Force need to meet the challenges in the future? Do we have an integrated approach to weapons system acquisition and deployment for the 21st Century? Or are we just doing the same old thing; each service being myopic in their view of the future? Will parochial battles continue to be waged? Will each service seek to feather their own nest at the expense of our sister services? Do we have the appropriate tools to wage this debate? Is the Air Force still fighting the battle for an independent air arm? Are we seeking to prove that as an independent Air Force we will still be relevant in the 21st Century?

Stealth Future

Major Gary Cole (USAF) raises some interesting points in a 1994 article, *The B-2 and F-22: Are They Needed?* In his writing, Major Cole points out that the F-22 is the single most expensive weapons system program in Pentagon history. He indicates that the original advanced tactical fighter concept was borne from the realization that the

aging F-15 would be an inadequate match for the new Soviet fighters to be developed in the 1990s.¹ The Air Force determined that they needed an air superiority fighter capable of defeating the developing Soviet integrated air defense system—a system that boasted advanced surface-to-air missiles and sophisticated command, control, and communications networks. The argument for the F-22 did not wane with the fall of the Soviet empire. F-22 proponents pointed to the newly independent republics and Russia and all the military technology that remains. These arguments continue to be made even with Russian defense spending being reduced by 72 percent. They point to the French Mirage Rafale and the Eurofighter 2000 as potential opponents in a future conflict.² While F-22 justification arguments point to Russia as a major supplier of arms, they seem to ignore the fact that developing nations can not afford to purchase and maintain fourth or fifth generation fighters—evidence the 100 MIG-29s unsold and sitting on a factory ramp in Moscow.³

Tomorrow's War Today's Decision

Robert W. Chandler and Ronald J. Trees recommend in their book, *Tomorrow's War Today's Decisions*, that "...the United States exploit its technological edge to develop a force posture and military strategy that emphasizes theater missile defense and long-range strike systems capable of deterring and defeating regional aggression from beyond the range of enemy weapons of mass destruction (WMD)."⁴ The author's position is that the United States needs to emphasize our strength in long range bombing and cruise missile capabilities to avoid the challenges faced by having to forward deploy troops and weapons systems.⁵ There are numerous examples to support their recommendations. Long after the war, Saddam Hussein began taking threatening actions in Northern Iraq—

sending three Republican Guard divisions to the town of Irbil, inside the protected northern no-fly zone. U.S. Forces were hampered by allies who did not want attacks to take place on Iraq which originated from their countries. While we had forces on the ground in countries adjacent to Iraq; our response was limited to options that included long range bombers, cruise missiles, and carrier aviation, originating from outside the land mass in the theater of operations. Even though the Iraqi military movements were in Northern Iraq, we struck ground targets in the southern no-fly zone.⁶

Gulf War success could have been denied coalition forces if forward basing rights were not granted. In a similar scenario without forward basing rights, the only forces available to engage in this type of conflict would be long range bombers and naval aviation. Chandler and Trees pose a very good question, "...why should the core military strategy still entail sending American forces relatively unprotected into a proliferator's back yard, where the success of the strategy hinges upon our capability to deter, defend against, or defeat his weapons of mass destruction, none of which can be guaranteed?"⁷ International politics and national self-interest often result in countries taking actions contrary to the wishes of their allies. Even the countries that we provide large amounts of foreign aid will not always succumb to our political desires. An example of this situation, in a non-military manner, is Turkey's natural gas deal with Iran. In 1996, the United States enacted the D'Amato Act to attempt to influence Iran to cease their support of international terrorism. This law restricts U. S. Companies and attempts to force foreign governments and businesses to refrain from engaging in major business transactions (more than \$10 million per year) with Iran.⁸ In spite of our national will and desires, this \$20 billion Turkish/Iranian gas deal has gone through. While Turkey is still a strong U.S.

ally, the gas deal is in the best interest of their country; they had no options that would have produced a badly needed gas supply that also generates significant income for their country.⁹ Under these circumstances, is it any surprise that foreign governments balk at the United States wanting to use our forces, temporarily stationed on their soil, for punitive air attacks against their neighbors. While the United States has a political agenda to pursue, we do not live in a vacuum. Other countries have national and international agendas also. Gaining consensus within the United States is enough of a challenge, the international arena is even less accommodating.

Chandler and Trees argue very effectively for employment concepts and doctrine that calls for long-range precision strikes. They point out that stealth bombers can operate with little or no support can be effective on the battlefield, and then recover at their home base, far away from the threat of WMD. The authors clearly believe that pursuing the F-22, F-18E/F and Joint Strike Fighter instead of bombers and long range cruise missiles is a serious mistake.¹⁰ They further point out that it is not a surprise that WMD threat considerations are not part of an overall integrated planning process; "...hamstrung by a budget-driven strategy making process, the U.S. military establishment has had an exceedingly difficult time seeing the big picture as it struggles to adapt to the post-Cold War era"¹¹ Chandler and Trees are not the only ones making this observation. Unfortunately, it appears that everyone with an opinion also has an agenda. Yet there are some excellent studies and analyses that are worth reviewing to gain further insight into this issue.

Air Force And The Next Generation Battlefield

Examples from one such study are found in the *2025 Study Executive Summary*, which indicates that *current* and *programmed* weapons platforms will be adequate for the anticipated threats of 2010, and that little more than expected systems modifications that normally occur in the life-cycle of a weapons system will be required.¹² Of course this means that, even though there is still a food fight occurring in Congress over full funding for all three tactical fighter programs, if all three programs go to full production, then we should be able to meet and vanquish any future adversaries on the battlefield. By today's standards, the tactical fighter program only provides two truly new designs, the F-22 and the Joint Strike Fighter. The F-18 E/F is only slightly modified from its current base platform. However, even the two totally new designs (F-22 and JSF) are not considered to be cosmic. In the Summary Volume for the *New World Vistas, Air and Space Power for the 21st Century*, the F-22, while considered to be superior to existing aircraft, will not be of such a radical change in technology to represent a quantum leap into the future. The F-22 "...will not produce a discontinuous change in the nature of aerospace warfare."¹³ This statement raises a serious question, after spending billions of defense dollars to acquire the F-22, how well will it perform against a sixth or seventh generation weapons? Notice I did not say a sixth or seventh generation fighter or air defense system. Weapons systems being produced today can be using no better than today's technology, but what about tomorrow?

Moore's Law—A Window To The Future

Moore's Law states that "...the [computer chip] average rate of capacity increase—is a doubling about every eighteen months."¹⁴ This means that the current day standard is

that computer technology will double every 18 months with the introduction of the next generation of computer system technology. That is the standard in 1997. To put this into perspective, one of the earliest computers, the Electronic Numerical Integrator and Calculator—ENIAC, which was created during World War II at the University of Pennsylvania's School of Electrical Engineering, weighed 30 tons and filled a 1,500 square foot room—stored approximately 80 characters of information.¹⁵ Standard personal computers on the market today hold 2-4 gigabytes, or 2-4 billion characters of information. Current expectations in the computer industry call for a new type of memory—holographic memory that will hold terabytes of characters in less than a cubic inch space. This means that this type of memory, no larger than a baseball or softball could hold the entire contents of the Library of Congress. Another comparison is the expense of computing. Today the average top of the line laptop computer cost \$2,000, yet the laptop computer of today can do more than a \$10 million IBM mainframe computer could in 1977.¹⁶

My point is that if the Pentagon gets their wish, we will sink hundreds of billions of dollars into the F-22, JSF, and F-18 E/F aircraft, while the rest of the world will continue to march to a commercial growth rate in the computer industry in keeping with Moore's law. We do not know—what we do not know. While we are pursuing acquisition programs that factor in U.S. Code to make sure that small businesses get to compete (read, buying systems built by the lowest bidder), the rest of the world will march ahead without such constraints. While 2025 and New World Vistas are forward looking, and the program managers for the F-22 are visionary in their development of the weapons system, no one knows what the threat will be in the year 2010-2025.

We also do not know what the weapons of choice will be in 2010-2025. Vietnam is a prime example of a technologically advanced superpower being brought to her knees by a third world country. We can sink billions into weapons systems for peer competitors, yet may not be able to compete with new, stealthy hypersonic surface-to-air missiles or space-to-air missiles in an integrated command network. Stated another way, in 1972, the early Intel Microprocessor had less than 5,000 transistors and could process less than 500,000 instructions per second. The average Pentium Chip contains about five million transistors and can process approximately 300 million instructions per second. At the current rate of growth in the microprocessor technology, the forecast for the year 2000 is the chips will contain 50 million transistors and be able to process approximately 1,500 million instructions per second.¹⁷ If Moore's law holds true, then by 2010 a single chip will contain 51,200 million transistors with an instruction execution capability of 1,136,000 million instructions per second. The implications for military hardware are almost incomprehensible.

The rate of increase in technology in a world of free and open markets means that any 'two-bit terrorist wanna-be' could obtain the means to wreak havoc on an open society. In that scenario, who does the F-22 attack? Even if you can tie the act of terrorism to a specific country, the increase in technology will surely have significant military applications that are not yet even on the drawing board. The assumption is that U.S. military technology will increase at a faster rate, or at least keep pace, with the open market. This assumption is flawed. Leading thinkers today suggest that we should overhaul the Department of Defense Acquisition process to eliminate the archaic bureaucracy that takes years to field new weapons systems. Anyone that has little regard

for the safety and welfare of workers developing weapons of mass destruction and a lot of money to throw at developing new ways to kill people, can obtain newer technology from the commercial sector faster than the current U.S. military acquisition process will allow. Martin C. Libicki draws a similar picture in his book, *The Mesh and the Net*, when he states that "...with every year, more and more technology comes from the commercial side. Even before the Cold War ended, the leading role of defense acquisition had begun to fade. Military electronics started lagging behind commercial electronics and could only hope to stay current through spin-ons of commercial technologies."¹⁸

GPS, A Former Military System?

In addition to new, as yet unknown technology, being available to future adversaries; we are pursuing a course of action that will aid future enemies on any battlefield by allowing the Global Positioning System (GPS) to become an open source that anyone with a GPS receiver can use to navigate with. GPS was a distinct coalition advantage during the Gulf War. However, the playing field may be level in the future. In a January 1997 Air War College Paper written by Captain George E. Slaven Jr., (USN), *GPS, A Former Military System?*; the point is well made about changes that are occurring in the Global Positioning System.

There are basically two types of GPS receivers, military and commercial. While the military receiver is inherently more accurate, there are situations where the commercial GPS receiver can be more accurate than its military counterpart.¹⁹ While the current military systems accuracy can be in the 5 -10 meter range, the civilian commercial GPS with new equipment upgrades can achieve accuracies in the 1 meter range.²⁰ The prediction is that by the turn of the Century, there will be eight civilian GPS operators for

every single military user. Many military GPS users argue for the ability to turn off civilian access to GPS during national emergencies. Unfortunately, that technology does not yet exist.²¹

The Global Positioning System is comprised of three nodes. The first element is 24 satellites in a medium earth orbit (11,000 miles). The second element is a passive receiver unit. The third element is the ground control stations. Two dimensional accuracy can be achieved by locking on to three satellites. Three dimensional accuracy requires four satellite inputs. With 24 satellites in space, the Global Positioning System promises that any point on the earth will always be within range of at least five satellites.²² There are commercial arguments against military restrictions on the use of GPS. If we eliminate civilian users from the U.S. system, they will just use the Russian GLONASS satellite navigation system, which have similar capabilities. While the 28 March 1996 Presidential Decision Directive delayed the final decision on giving full civilian access until the year 2000, it appears that the political pressure will be great enough to ensure full commercial access and exploitation of the Global Positioning System.²³

The military significance of the GPS decision is far reaching. Ramifications on a future battlefield could be devastating, the next time we attempt a “left hook,” there may be someone there waiting for us. However, a future enemy employing GPS technology is not our only GPS concern. As this technology becomes more available, it also means that potential enemies can have their scientist pursue counter GPS programs. David A. Fulghum points out in a 6 February 1995 Aviation Week and Space Technology Magazine article that “...some defense researchers believe a reasonably sophisticated foe

or weapons exporter such as Iran, Iraq, North Korea or China, might find it possible to foil GPS-aided weapons systems with something as simple as a broad-band low-power jammer.”²⁴ This thought could be drawn out to the logical conclusion that GPS could be denied anyone on the battlefield and we would be back to square one, using current day technology for navigation and targeting. From a strategic standpoint, the optimum situation would be multiple on-board and off-board redundant systems that would allow friendly use of GPS, while denying the enemy use of the same battlespace.

In the future, American warriors will not only have to face adversaries with space technology, but we will also be challenged with a new generation of fighters, every bit as capable as the next generation of U.S. fighters, assuming that the next generation of U.S. fighters are funded for full production. The big difference with these fighters, they will be highly lethal and non-U.S. or non-Russian made.

The Gray Threat

Funding for the F-22 is far from guaranteed. A 13 March 1997 story by Ernie Freda and Mark Sherman in the Atlanta Journal/Atlanta Constitution emphasized that even those in congress that are pro-military have grave concerns about the F-22 program. Representative Stephen Buyer (R-Indiana), “...a self-described defense hawk, brought a distinct chill to a room of congressional supporters of the F-22 stealth fighter project [recently] when he questioned General Ronald Fogleman, the Air Force Chief of Staff, on the plane’s cost. “I don’t want another overbudget plane that we have to think twice about deploying because losing one costs so much,” said [Representative] Buyer, Chairman of the military personnel subcommittee. [General] Fogleman said the F-22

would be a “buy at \$71 million,” the projected cost of each of 438 planes, slated for service in 2004.”²⁵

While you can not totally discount the potential threat from a future opponent flying the latest Russian technology; for the sake of the argument, let us assume that Russia ceased to export advanced fighters—would anyone fill the void? This question is addressed in, “*The Gray Threat*,” a February 1996 article in the Air Force Magazine. A RAND research team concluded that there are several different types of European fighter aircraft in development that would be an equal match, or would exceed all current U.S. fighters. The research team indicated that the F-22 would be the only U.S. fighter that would enjoy superiority over next generation European fighters.²⁶ The aircraft that is the greatest threat as a potential export fighter from Europe is the EF-2000. This fighter is a joint venture from aerospace industries in the United Kingdom, Germany, Italy, and Spain.²⁷ In computer combat modeling conducted by RAND researchers, the rating for the F-22 was the highest with a .91 score and the EF-2000 was second with a .82. The measure of merit indicates an inferred exchange combat ratio of 10:1 for the F-22 and of 4.5:1 for the EF-2000. A major point made by the British Aerospace Industry is that the F-22 is only about ten percent more effective on the overall scale mathematically, yet cost twice as much per copy as the EF-2000. RAND also determined that there is a high degree of probability that all three European fighters considered would likely be produced and marketed outside of Europe in considerable quantities.²⁸

F-22 Funding—TBD

Several senior three and four star generals are quoted as saying that the F-22 program is nothing less than great, in a William Matthews 17 February 1997 Air Force Times

story, *Air Force officials worry about funding for the F-22*. The Air Force media push to sell the success of the F-22, even before its first test flight in May 1997, is worthy of a Madison Avenue advertising executive. General John Lorber, Pacific Air Forces Commander said that "...the Air Force needs the F-22 to guarantee its air dominance in the future...Malaysian pilots flying MiG 29s proved a challenge for American pilots during recent exercises."²⁹

General Richard Hawley, Commander of Air Combat Command said, "...too many people, including some senior military leaders, fail to understand the importance of air dominance, air dominance means the United States controls the sky over a battle zone...without air dominance, the U.S. military would be deprived of key assets such as airborne command centers, Airborne Warning and Controls Systems, and Joint STARS radar planes, that provide a superior view of the battlespace. U.S. attack planes would have to fight their way to their targets and defend themselves while bombing...General Hawley asked, under these circumstances, how accurate would their strikes be?"³⁰ However, Matthews also quoted others in his article who do not necessarily share the same view as Generals Lorber and Hawley, "...many defense experts ask why the Air Force's fleet, which provides the U.S. with air dominance today, cannot continue providing it...according to the General Accounting Office, no other country comes close to challenging U.S. air power now or in the foreseeable future."³¹ Eric Pages, from Business Executives for National Security indicated "...the primary issue is that since there is no threat, should we build a new plane with current technology or leapfrog to the next generation...with a defense budget that is still shrinking, affordability has become a much more important argument."³² General Hawley counters that "...during the peak

productions years for the F-22, the program will only consume two percent of the defense budget.”³³ While these senior Pentagon officials claim that the F-22 program is effectively and efficiently run, not everyone in Washington agrees with this position. Senator John Warner (R-Virginia) recently disclosed that the F-22 program is \$15 billion over budget.³⁴

Fearing the worst possible outcome, the Pentagon had senior Air Force personnel testify before Congress that the F-22 program cost are now back under control. Mr. Art Money, Chief of Air Force Acquisition and Lieutenant General George Muellner, Deputy Acquisition Chief, testified that they “...cut \$12 billion from the F-22 program since November. Steps ranging from ‘shop-floor’ efficiencies to multiyear contracts, have brought the program back to its \$48 billion projected cost.”³⁵ The question remains will congress buy this new found revelation as evidence of new efficiencies or will they see this testimony merely as smoke and mirrors? It is obvious that the Air Force has the full court press on for the F-22 program, survival situations normally require drastic measures, the senior Air Force leadership most definitely see this as a must tell—must sell story.

However, the F-22 does represent a significant advance in aviation technology. David A. Fulghum points out in a 6 January 1997, Aviation Week and Space Technology article, “*Expanding Roles May Shield F-22,*” that F-22 capabilities are being more openly discussed to ensure that the public, media, and congress are aware of its potential lethality. In addition to speed and stealth, system capabilities are now being advertised to include F-117 stealth bombers roles, F-4G Wild Weasel radar killer capabilities, and the reconnaissance missions currently being performed by RC-135 Rivet Joint electronic

warfare aircraft.³⁶ This means that the F-22 is now being touted as a fully capable ground attack platform, deep interdictor, and will also be capable of advanced electronic reconnaissance. Suppression of enemy air defenses is also being addressed as a possible mission for the F-22. However, Air Force personnel also point out that to achieve maximum stealth effectiveness that the F-22 will have to be flown at “specific altitudes relative to enemy radars.”³⁷ The F-22 is not being advertised as a replacement for platforms such as the RC-135, but merely as an enhancement support platform that could extend a similar type capability well into the enemy’s territory. Another Air Force official stated, “...look what [the] F-22 brings to the table, good connectivity with off-board sources, a sensor suite that collects a lot of information on its own, plus an electronically scanned array radar that has good sensitivity against low RCS [radar cross section] cruise missiles.”³⁸ David Fulghum points out later in the same magazine that F-22 company officials indicated that the F-22 is “...eighteen times more survivable than a conventional fighter [today].”³⁹ If it performs as advertised, other platforms will be able to survive to fight; the F-22 will be the dominant airpower threat to enemy air and ground forces in the 21st Century.

However, General Fogleman, Air Force Chief of Staff, indicates that eliminating or delaying the F-22 program could force the Pentagon to re-evaluate other tactical fighter enhancement programs. Secretary of the Air Force, Sheila Widnall, indicated that “...the F-22 is essential in a world of improving radars, more advanced missiles and better enemy fighters...we couldn’t operate safely in Bosnia, and only the F-117 was able to fly at will over Baghdad.”⁴⁰ General Fogleman said “...he has flown the Su-27 fighter like those Russia has sold to China, from an airframe and engine perspective, it is the equal of

the F-15...and the Chinese are building a missile similar to the Advanced Medium Range Air-to-Air Missile [AIM-120, AMRAAM]...the United States needs a stealthy air superiority fighter...stealth doesn't make you invisible to the eye, or even to radar, but it shrinks the envelope in which planes are vulnerable to enemy missiles, so you can operate and survive.”⁴¹

In an attempt to make sure that the public is aware of the facts surrounding the F-22, General Richard Hawley, Commander of Air Combat Command authored a full page story on the airplane, “*The F-22 will ensure air dominance,*” which appeared in the 10 March 1997 Air Force Times. In his story, General Hawley pointed out that future adversaries have studied the way America goes to war, and are preparing to defeat us on the battlefield by developing complex air defense systems that employ advanced technology surface-to-air missiles, like the Russian SA-10 and SA-12. Any enemy would know the value of eliminating the U.S. ability to gain and maintain air superiority. General Hawley cited recent studies by the Institute for Defense Analyses, which states, “...they examined the ability of various aircraft to engage targets in the face of defensive systems that we can expect to encounter in 2015. They concluded that the F-22 will be able to attack 12 times the number of targets that could be engaged by conventional aircraft such as today's F-16—without exposure to attack by the surface-to-air missiles that will be the foundation of those 2015 defenses.”⁴² This article was one of first to also suggest that the F-22 would have a multi-role capability, making it more attractive to anti-F-22 forces. General Hawley said that “...the combination of stealth, super-cruise and advanced avionics will give us a, first-look—first-shoot, first-kill capability...moreover, the F-22 will be capable of delivering accurate air-to-ground weapons to hit crucial

targets deep in enemy territory long before they can threaten our deploying forces.”⁴³

This statement assumes that the continuing pace of technological development does not lead to any weapons systems that will be effective against the F-22. Again, we do not know what we do not know.

Thirty years ago when the F-15 was on the drawing board, few visionaries would have forecasted Pentium laptop computers and the Internet revolution. However, the counter-argument is very simple, do we dare to not go into full production of the F-22? General Hawley points out the cyclical process for aircraft modernization, “...in the early 1970s we began to replace the Vietnam-era fighter force with the F-15, F-16 and A-10. In the 1980s, we turned attention to the bomber force and developed the B-1 and B-2, and substantially upgraded the B-52 and the KC-135...the 1990s have seen another shift in focus, this time to the airlift force with development and deployment of the C-17 which is replacing the C-141...this brings us full circle, it is time to begin a new modernization cycle and return our focus to the fighter force that is showing signs of age.”⁴⁴ The question is, does this cyclical process meet the nations requirements? Is it time to change the sequence in the process? The real question about this cyclical modernization process is, what or who drives the train? What play does visionary thinking have to do with the weapons we purchase for our forces to use in combat?

Which Came First, Doctrine Or Technology? And What About Acquisition?

Another question is should doctrine drive technology or should technology drive doctrine. As pointed out in previous chapters, this issue becomes almost lost in the fog of the discussion. George C. Wilson addresses the complexity of this issue in a 10 March 1997 Air Force Times article, “*What Kind of force does the U.S. need?*” Mr. Wilson

points out that this issue has been studied to death. When General Colin Powell was Chairman of the Joint Chiefs of Staff, the bottom-up review (BUR) of force requirements was completed. The analysis of the BUR concluded that the U.S. should be able to conduct, two nearly simultaneous major regional contingencies (MRC). The upcoming Quadrennial Defense Review does not have the mandate of defining what our force structure should be to support a two MRC concept. Rather, the QDR should "...conduct the review with a view toward establishing a revised program through the year 2005."⁴⁵

Mr. Wilson feels that the mountain of research on the defense issue will never be waded through by all 535 congressional defense experts or by the 40+ congressional defense committees. His argument, borrowed from President Carter's national security advisor, Mr. Zbigniew Brzezinski, is that "...it is kind of ridiculous for the Pentagon to decide how many wars we are going to fight...for all I know, maybe all we need is to fight just one regional war and maybe no longer worry about nuclear war or two regional wars...then maybe we need to fight one nuclear war and three regional wars...but until we decide that, there's no basis for any review...once the political leadership, not the Pentagon, decides how many wars the American military should be able to fight at once, it is the task of Presidential leadership to say to the country, this is what we need over the next decade or so, it will cost roughly so much, and then the Congress can decide whether the country is prepared for it."⁴⁶ This argument follows the logic that the best way to prepare for the future is to first define the requirements, to shape the strategy for the future—then define the doctrine for the future; once that is all accomplished, then—and only then—will we be ready to make the best decisions about where we should spend our defense dollars. Mr. Wilson's article recommends that the President should end his

silence on this issue, he should take the lead and tell military leaders and the public what kind of military he wants America to have in the 21st Century.⁴⁷

Military history is replete with examples where poor acquisition and strategy decisions had disastrous results. Before World War II, General Walther Wever was Chief of the German Air Command Office in the 1930s. His real position was the Chief of the Air General Staff. General Wever was a visionary leader. His goal was ten thousand aircraft of all types. He believed that to define the types of planes, one must first define the kind of war. The aircraft he felt would be needed to defeat the Soviet Union was a four-engine strategic bomber, which he called, the 'Ural Bomber'.⁴⁸ In the 1930s, Wever was looking toward a future war on the continent with a keen eye toward strategic goals. Much like Douhet, he described a strategic air war as, "...the destruction of the enemy air force, his army, his navy, and the source of supply of the enemy's forces, the armament industry...cautioning that only the nation with strong bomber forces at its disposal can expect decisive action by its air force....Subsequently, Wever made production of heavy four engine bombers his number one priority."⁴⁹ Fortunately for the allies, possibly the greatest airpower visionary for Germany was killed in an aircraft accident on 3 June 1936. In April of the following year, Herman Goering canceled the Ural Bomber. This was a great strategic error on the part of the German Air Force senior leadership.⁵⁰

Another example of strategic level acquisition planning mistakes occurred when, during World War II, Germany developed the Me-262. The Me-262 had great potential as a fighter. Unfortunately for the Germans, Hitler demanded that the aircraft be built as a bomber. Early in the war in Europe, the German Minister of Armaments, Albert Speer wanted to produce jet fighters, but in 1941 Hitler vetoed the request because he felt

Germany would win the war before jet fighters could be in full production. In January 1944, Hitler finally approved full scale production of the Me-262 with the caveat that it be modified as a bomber. The Me-262 was totally ineffective as a bomber—but had the aircraft been fully produced as a fighter early in the war, the outcome may have been quite different.⁵¹ The question one must ask is, are we looking toward the future to produce the type of weapons systems that will be needed in any future war? Or is our production plan as flawed as Germany's plan in WWII?

Age Of The Fleet

An important question about American weapons production is, are we buying the systems necessary to ensure the Air Force is capable of meeting wartime requirements in the next century? Franklin C. Spinney points out in *"Anatomy of Decline,"* that the average airlift and bomber aircraft in 2011 will be thirty-one years old. However, the average tanker aircraft will be forty-eight years old in 2011. The youngest aircraft in the Air Force fleet will be fighter/attack aircraft at twenty two years or age, partly because of the deployment of F-22 aircraft starting in 2004.⁵²

The average fighter age will continue to decrease with the Joint Strike fighter coming into service in 2008 as we retire older F-15s and F-16s. The E-3, Airborne Warning and Control System aircraft fleet will also be in excess of thirty years of age in 2011; there is currently no replacement platform being considered for the U.S. E-3 fleet. Will this aging fleet meet our operational requirements in the 21st Century? Considering that there are plans to keep some of the B-52H models flying at a ripe young age of 70, one would think thirty or forty year old aircraft would be no problem.⁵³ However, aircraft—like other things built by the fallible hand of man, sometimes do not operate the way they should, or

they just wear out from overuse. Time takes its toll on all things. Each and every time an aircraft cycles (pressurizes), there are great stress factors placed on the aircraft. While the Air Force maintenance system is among the best in the world, even the best mechanic can not keep airframes and systems from wearing out over time. There comes a time in the life cycle of things mechanical, when further maintenance and repair is cost prohibitive. That is of course, assuming that the capabilities of the platform are still valid and the system still meets mission requirements.

The question to be put to the public and members of congress is, do you want your sons and daughters flying operational missions at 400+ knots, 200 feet above the surface of the earth, in a seventy year old aircraft? Unfortunately, Air Force heavy bombers are being eliminated from the Air Force inventory at a faster rate than any other aircraft type. While they are old and have millions of miles in their log books, heavy bombers are still the weapons platform of choice for senior Pentagon officials and war planners, because they offer a full range of effective options. They are extremely flexible, can deliver weapons with near pin-point accuracy—or can deliver a heavy bomb load thousands of miles from American shores, and then recover without needing forward basing rights; or before weapons delivery—can be called back without the enemy ever knowing that the bombers were enroute, unless we chose to tell them.⁵⁴

Heavy Bomber Study

John A. Tirpak addresses some key issues about the U.S. ability to project power in the future in a July 1995 Air Force Magazine article, *The Pentagon Declines More B-2s*. He points out some startling revelations from the Heavy Bomber Force Study mandated by Congress and conducted by the Pentagon. Unfortunately, the significance of bomber

forces has been lost in the tactical air forces debate over the F-22, JSF, and the F-18E/F. The study indicated that bombers are very important in the “halt phase” of operations as tactical air is enroute. After we have a secure base of operations, have rolled back the enemy and established air superiority, bombers are not as important. However, a major flaw in the Heavy Bomber Force Study is the assumption that we would have fourteen days’ warning before outbreak of hostilities. We had less than one weeks indications and warning in both the case of the Iraqi invasion of Kuwait and the North Korean invasion of South Korea.⁵⁵

Mr. Tirpak also takes exception with the Roles and Missions Commission Staff Report. He indicates that they also made faulty assumptions in their analysis. He points out in the article that the Roles and Missions Report is based on the premise that the U.S. could deploy 800 tactical aircraft in two weeks; yet, during Desert Shield, we only deployed 200 in the first two weeks. The report also assumed significant host-nation basing rights for future overseas conflicts; even with our closest of allies, basing can not be assumed. Even if basing rights are granted in a future conflict scenario, an astute adversary may eliminate the basing option with weapons of mass destruction.⁵⁶

Airlift And Aerial Refueling Are Also Critical

On 15 February 1996, General Ronald R. Fogleman, Chief of Staff of the Air Force, gave a speech at the Air Force Association Symposium, which stated, in part, "...we're procuring the C-17 in the near term to address the nation's most pressing military shortfall—strategic lift. Our investment in the C-17 has already been demonstrated in an active crisis where we've seen the ability of that aircraft to take C-5 and C-141 loads into C-130-type airfields."⁵⁷ In a future world without a cold war equivalent of forward basing, airlift and aerial refueling will be absolutely critical to the success of overseas military operations. The Gulf War may have been concluded very differently had basing rights not been granted. Fortunately, countries welcomed American and Allied Forces. It is also fortuitous that we had an aerial refueling fleet that could meet the challenge when they were needed most.

During the Gulf War, aerial refueling was critical to both the deployment and the employment phases of operations. A tanker fleet of over 100 aircraft established aerial refueling support over both the Atlantic and the Pacific oceans to ensure the deployment of 1,000 aircraft into the theater. During the war, Air Force tankers flew approximately 17,000 sorties.⁵⁸

Strategic Airlift

Like the venerable B-52 and KC-135, the diminishing fleet of airlift forces are a concern as well. We are fast approaching a critical phase point in the availability of strategic airlift. David A. Fulghum presents some compelling arguments for the acquisition of additional airlift in a 24 April 1995 Aviation Week and Space Technology Article, *Airlift Studies Examine Need for More C-17s*. The stated national policy is to be

able to fight two nearly simultaneous major regional conflicts (MRC). However, Mr. Fulghum points out that airlift would have to be providing critical lift in both theaters with a very limited airlift capability. In his article, Jeffrey Record, a senior research associate at Georgia Tech's School of International Affairs, indicates that he does not believe "...that the U.S. has not had the capability to fight two near simultaneous wars since 1945...we don't have enough of anything to fight two wars."⁵⁹ These are not just one individual's beliefs. The article indicates that senior defense officials also acknowledges the shortage "...when there are indications and warning of a new conflict, maybe 5 or 10% of the airlift is pulled off to give you a head start on the second war...at some point you complete deployment for the halting phase in the first conflict, then more than half of the airlift force swings to the new battlefield."⁶⁰

There are other high ranking military personnel telling this same story. In testimony before the House National Security Committee panels on the readiness of the armed forces, Lieutenant General Ronald Iverson, Commander, U.S. Air Forces in Korea, and Commander, 7th Air Force indicated that "...we are beginning to see the overarching effects of increased tempo of our supporting sources, the units we depend on to fight the war. For example, [because of] worldwide competition for diminishing electronic-combat aircraft, we are finding it increasingly difficult to count on these assets to suppress enemy air defenses when we need them in our war plans, we are seeing the same trend for heavy bombers and strategic lift."⁶¹ While pre-positioning ships saved 3,500 sorties of strategic airlift during the Gulf War, they can not begin to finish the job.

The *Gulf War Air Power Survey, Volume III*, indicated that, "...by March 1991, strategic airlift had moved over 500,000 people and 540,000 tons of cargo. At the height

of the Desert Shield airlift, Military Airlift Command's (MAC's) cargo movement averaged 17 million ton-miles per day. By comparison...during the Berlin airlift [they flew] 1.7 million ton-miles per day.⁶² The future challenges of airlift in the next century are even more demanding than they were during the Gulf War. The demand is not only for outsize cargo into far and away remote locations, but as the *Airlift 2025 Paper* states "...the goal is to supply personnel and equipment as needed within 10 meters of the target. System costs will be high and adversely affect the development of any new system or major component without research, development, and production in the civil sector to support it."⁶³ These requirements will prove costly to the Pentagon. Yet, to be effective on a future battlefield, we are going to have to be creative and provide the warfighter the tools to wage war in the most remote of locations.

Challenges For New Secretary Of Defense

In the 9 December 1996 USA Today story "*Challenge for Cohen: Break the Mold*," Steven Komarow points out some interesting issues that need to be considered by the new Secretary of Defense, William Cohen. Komarow indicates that a new Joint Chiefs of Staff threat assessment indicates that potential adversaries are adopting operational concepts more like gang warfare than combat operations. He points out that Iran learned valuable lessons from the inability of advanced U.S. technology to deal with the mobile Scud missile threat. Iran not only learned well, but is putting their defense dollars into a "rocket arsenal" instead of ground warfare equipment like tanks. Komarow indicates that military planners believe that Iran's strategy is to have the ability to simultaneously target every airfield in the region with hundreds of missiles prohibiting the United States from deploying forces. They also believe that Iran would be able to keep the Navy out of the

Gulf with cruise missiles. While the top three Pentagon modernization programs are all aircraft (F-22, F-18E/F, and the Joint Strike Fighter) with a combined price tag of \$350 billion over the next 15 years; General Jack Sheehan, Commander of U.S. Atlantic Command openly speculated at an Army technology conference last month "...whether, instead of making fighter planes more radar-invisible, the next stealth project should be a troop transport."⁶⁴

2010 & 2020 Wargames

A war game called Strategic Force '96, conducted at the Maxwell AFB Wargaming Institute, 17-21 November 1996, pitted the United States against Iran in a 2010 scenario. This scenario had Iran invading Kuwait and Saudi Arabia with the United States trying to evict them as we did Iraq in the 1991 Gulf War. Lieutenant General John Jumper, Air Force Deputy Chief of Staff for plans and operations said after the wargame that future enemies will not be inclined to engage the U.S. directly in a force-on-force campaign. Rather, he felt that having learned the lessons of Desert Storm, that future enemies will pursue a protracted conflict without the benefit of six months to deploy supplies and build up force strength.⁶⁵ The Air Force is not alone when it comes to war gaming futuristic scenarios.

The Army War College conducted an exercise from 27 January to 6 February 1997, which simulates a war that takes place in the year 2020. As one would imagine, a war that occurs 25 years from now heavily involves space operations. In this future war, a combination of ground based, airborne, and offensive satellite weapons (including nuclear attacks against satellites) destroy almost every satellite in earth orbit—returning this future world to a time when long haul communications was demonstrated by the

television reception of the Jack Benny show in the 1950s.⁶⁶ This future battle demonstrated the even greater dependence on satellite technology in the future. With the significant need to ensure uninterrupted satellite support for communications, intelligence and, in the future, for offensive capabilities; the Army sees a strong need to develop the ability to engage enemy satellites in space. Unfortunately, budgeting for these systems have been scaled back to the point that they were not funded for test and development in the 1998 budget. This is a serious setback perceived by the Army Space and Strategic Defense Command. Their analysis concluded that "...U.S. casualties in Desert Storm could have been in the tens of thousands if Iraq had had access to real-time satellite data."⁶⁷ With the commercialization of space, this scenario may become reality.

We have already made 'business decisions' to make GPS available worldwide. At the rate of growth in microprocessor technology, and worldwide availability—we do not yet know what our threats will be in the 21st Century. Unfortunately, this is one battlefield that we may not have the capability to shape. Our standing in the world as the leader in military technology will not keep pace with a rapidly changing commercial environment unimpeded by the congressional budgeting process and the bureaucratic military industrial complex.

White Commission—Roles And Missions

In an August 1995 Air Force Magazine article, "*Surprise Package on Roles and Missions*," John T. Correll discussed findings from the year long "White Commission" report that was released on 24 May 1995. One major point of the report dealt with some of the parochial issues, by not addressing the perennial conflicts between sister services, other than saying that they are "non-issues. . . the real question the commissioners said, is

no longer, who does what but how do we ensure that the right set of capabilities is identified, developed, and fielded to meet the needs of unified commanders.”⁶⁸ This is an issue which the new Secretary of Defense, William Cohen, will have to deal with during the Quadrennial Defense Review (QDR). However, Secretary Cohen will have an able assistant, shortly before the end of the White Commission study, Dr. White, the chairman of the panel was nominated to be the Deputy Secretary of Defense. It is to be hoped that Dr. White’s experience on the commission will translate into an effective and equitable resolution to challenges to be considered during the QDR.⁶⁹

Quadrennial Defense Review (QDR)

During an interview with George C. Wilson of the Air Force Times that appeared in a 17 March 1997 issue, Secretary Cohen indicated that he set some specific parameters for the Joint Chiefs of Staff and the QDR panels; that they should look to the world of 2010 and try to visualize the threats and then to address the military needs to meet those threats. His expectation and challenge to the JCS and QDR panels is that the defense budget will be no more than \$250 million each year (adjusted for inflation), and yet—the recommendations should be strategy driven. He further indicated that the United States can maintain a two MRC capability if we “...make the right decisions on the systems and the requirements.”⁷⁰

The Vice Chairman of the Joint Chiefs of Staff, General Joseph Ralston, indicated in congressional testimony on 5 March 1995 that options on fighter aircraft acquisition include “...canceling either the F-22, the Joint Strike Fighter, or the F-18E/F; or reducing the number of planes to be purchased by 25 percent or 50 percent...another option, and the one [General] Ralston appeared to favo...going forward with all three programs...at

an estimated cost of \$350 billion over several decades.⁷¹ General Ralston pointed out the fact the United States “...has not developed new [tactical] airplanes for almost 30 years.”⁷² He also pointed out that the \$350 billion is only 16 percent of the total planned Pentagon weapons expenditures for the next few decades and that the 4,400 aircraft that will be purchased are well within our budget. He further explained that reducing any of the programs would not be cost productive and efficient. As production goes down, unit cost increase. Additionally, canceling any one of the three aircraft would lead to additional cost prohibitive expenditures to keep current weapons systems flying, or buying other interim replacement aircraft.⁷³

21st Century...And Beyond

In the 4 October 1996 White Paper, *Aerospace Power for the 21st Century: A Theory to Fly By*, the Strategic Aerospace Warfare Study Panel (SAWS) concluded that many of the challenges faced by the Air Force have their roots in the historical conflicts between members within the Air Force. One of the most obvious was the fighter and bomber debate.⁷⁴ However, misplaced enthusiasm throughout the Air Force often became the source for internal strife. Instead of becoming a united force behind the principles of airpower, we were often fragmented into our own groups that showed allegiance to A particular weapons system or career specialty. This experience was in no way limited to the Air Force, our sister services also had similar internal battles. The major difference is that they debated less in the media and were more private about their rivalry. The SAWS panel recommends the Air Force “...develop and embrace a vision of *aerospace* power sufficiently compelling, forward-looking, and suited to geostrategic circumstances...solidly grounded on the nature of real war...[to] unite the useful

fragments of earlier thinking about air power with the lessons of more recent practice into a coherent whole. Further, if this vision is to be persuasive, it must also produce lower-risk, lower cost solutions to the full range of contingencies and crises that the United States can be expected to face in the early decades of the 21st Century...airmen must not only grasp the strategic promise of aerospace power...but must become more effective in articulating this promise to their military peers, to the country's civilian leaders, and to the American public.”⁷⁵

The ability of advocates to sell airpower capabilities to the senior military and civilian leaders has been a challenge for as long as the airplane has existed. Between World War I and World War II, airpower advocates attempted to demonstrate airpower capabilities by intercepting a ship 725 miles from the coast by B-17s. Unfortunately, instead of demonstrating a developing technology, this 1938 event almost kept the B-29 from being built. The Joint Army—Navy Board supported the position of the General Staff of the Army that a bomber with greater range and size would not be required. Fortunately, the technological developments embodied in the B-29 were seen as necessary to the long term defense of America and the B-29 was not lost in the political conflicts of the time.⁷⁶ The question remains to be answered as to whether the Air Force that enters the 21st Century will be shackled to early 20th Century thinking by bureaucrats, short sighted military leaders, and politicians more concerned with reelection than with ensuring the United States is poised to meet the challenges on future battlefields and be victorious in combat.

In “*Global Engagement: A Vision for the 21st Century Air Force, Section IV, Air and Space Power for the Next Century*” it states that “...full spectrum dominance depends on

the inherent strengths of modern air and space power—speed, global range, stealth, flexibility, precision, lethality, global/theater situational awareness and strategic perspective.”⁷⁷

Russell D. Shaver presents some intriguing points for discussion in an Air Force Magazine February 1994 article, “*The Case for Airpower Modernization.*” The article references several RAND studies that address weapons systems modernization. Bomber forces were shown to be a highly effective method to shape the outcome of large scale conflicts. However, to achieve maximum effectiveness, the bombers’ systems [both platforms and weapons] need to be modernized.⁷⁸ Other recommendations by Rand included, “...procure the F-22, fully fund and integrate an array of air-to-ground weapons, fully fund the bomber roadmap and consider additional measures to improve conventional bomber capabilities, dispense with any new Navy interdiction fighter program, [and] delay the multi-role fighter decision.” They felt that these decisions would maintain our current capabilities while also ensuring that we would be prepared to meet the challenges presented by any future military conflicts.⁷⁹

Summary

In this chapter we looked at key airpower issues, some of which, we have been struggling with for decades. Each service fights the same battle, looking into their crystal ball to try to guess the future, then—magically, coming up with just the right weapons system to meet the new threat. There is no doubt that the Department of Defense Acquisition process is in need of change. How much change needs to be the topic of an extended research by acquisition professionals. From a lay-person’s point of view, the

process needs to be streamlined to take advantage of the revolution in technology. We cannot afford to continue buying equipment that is outdated when it reaches the Soldier, Sailor, Airman, or Marine in the field.

One issue that is obvious, we must have a clear vision of the future and need to take steps to establish doctrine easily comprehended and articulated by all Airmen. This Airpower Doctrine should be a defining aspect of our technology, which in turn, should lead the acquisition process.

As far as the acquisition of the platforms discussed in this paper is concerned—yes, we need to buy them all. The question is, in what order. While there may be a better mouse trap just around the corner, few would be willing to bet the farm on that probability. Investing in the future requires hard decisions be made. Each decision has an associated opportunity cost. Every choice you make results in an option not exercised, a path not taken. Again, we need to get on with the business of being Airmen. The F-22 appears to be the best we can acquire with the most current technology available. If a revolution in technology occurs before the full production is complete, then modify the aircraft as required and as taxpayer's dollars will allow. The Joint Strike Fighter and F-18 E/F should also be pursued. Both aircraft have their place in the tactical fight. The real question is, can we afford to not purchase these aircraft? While the Russians may have Mig-29s sitting on the ramp in Moscow, that does not mean that they will be there tomorrow, and after all, we are in the business of fighting and winning our nations wars. Should we be forced to use outdated equipment when viable alternatives exist? However, pursuing tactical fighter replacements should not be at the expense of all other platforms. We should ensure that the modernization cycle continues to keep all required weapons

systems viable. To this end, we should accelerate the modification and replacement of tanker, airlift, surveillance, and bomber forces. Sooner or later everything breaks, wears out, or just stops working as it should. In the meantime, the United States should aggressively fund research and development of emerging technologies. We need to remain tied to commercial development, always looking for military applications for commercial technologies.

Only through an aggressive program will we be able to demonstrate worldwide leadership and forward presence. We will still have to be prepared to deploy into a theater. Yes, there is an associated risk for forward deployments, and we should do everything possible to minimize that risk. At the same time, we can never allow anyone outside the U.S. to restrict our options or attempt to dictate our international policy. However, we can not deploy hopes and dreams of a new fighter or bomber. Flexibility is the key to airpower and success on the battlefield. We must never take counsel of our fears or allow an enemy to write our operations orders. Even though new weapons systems are expensive—the alternative is even more costly.

Since it appears that the Global Positioning System will be open to worldwide commercial access, we should seek ways to use that for our advantage. Rather than shutting the system down during an international crisis, we should develop ways to introduce false signals targeted to specific units or locations that drive our enemies into traps that we set on the battlefield. The tie-in for further military application could be significant. One of the greatest shortfalls during the Gulf War was our inability to eliminate Iraq's Scud Missiles. While they were, militarily insignificant, we expended inordinate amounts of resources against this "non-threat." The technological

improvements that will evolve will change this situation drastically. Scuds will become relevant; it is just a matter of time. The overall threat is the proliferation of missile technology. The 2010 Wargame may be more realistic than many would like to admit. We need the ability to locate, target and destroy missiles immediately after launch, while they are still over the enemy's territory, so that they can reap the benefits of what they sew. Missiles may be the greatest emerging military threat we will face on the battlefield or in our cities. Our pursuit of a military answer to the missile threat may best be routed through space, in defensive and offensive weapons. We need to continue funding research in this vital area to ensure battlefield and battlespace dominance in the future.

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Chapter 4

Summary and Conclusions

In *Chapter 1* we analyzed the development of airpower doctrine employed by the United States during World War II. The main emphasis during the years preceding WW II was strategic bombing. Information presented in *Chapter 1* indicated that pre-war strategic bombardment doctrine was based on faulty assumptions which were not fully operationally tested and validated prior to becoming national military policy. It was also shown in the first chapter that the United States entered WWII with airpower doctrine that did not fully integrate potential warfighting tools, tactics, techniques, and procedures. Blind loyalty by airpower leaders to the dogmatic belief that the bomber will always get through resulted in the misapplication of airpower. These faulty assumptions resulted in long range fighters not being available early enough in WWII to establish air superiority over the German heartland resulting in thousands of unnecessary losses.

Chapter 2 traced the history of the U. S. Air Force doctrine development since WWII. We found that airpower doctrine development has been an ongoing struggle since the earliest days of powered flight. Unfortunately, this struggle continues on today. In reviewing the development history of Air Force doctrine, we found a clearly defined need for a single integrated airpower doctrine early in WWII. The early Air University mission statement tasked AU to develop Army Air Force basic doctrine. Yet, in the middle of a

world war, trying to develop any significant doctrinal change was a challenge too great for any one organization. The British had bought into night time area bombing and the United States had signed on for daylight precision bombing, little would change those concepts of employment doctrine. The political reality is that early airpower doctrine in the United States was driven to support an independent Air Force. Early airpower enthusiast knew that since strategic bombing was a mission that only an air force could accomplish; proving the validity of the strategic bombing mission would add much fuel to the fire in supporting an independent air force.

Chapter 2 also pointed out some of the underlying conflicts that has affected airpower doctrine development; the fighter bomber debate from before WWII raged long after the war was over. The nuclear bomb added much to the relevancy of strategic air forces and diminished the strength of fighter forces. The arms race with the Soviet Union supported large bomber forces at the expense of tactical air forces. A major problem is that General Arnold's challenge to ensure doctrine led our technology has often gone unheeded. Since our inception, the Air Force has been defined more by the tools of our trade than by the employment integration concepts for those tools.

Chapter 2 concluded with some recommendations of modification of the curriculum of the Air War College, Air Command and Staff College, and Squadron Officer School. The establishment of the Air Force Doctrine Center at Maxwell Air Force Base presents some unique opportunities. A slight modification to the curriculums of the three Air University Schools to take advantage of the research and learning opportunities that the new Doctrine Center will present, would pay high dividends. Establishing quarterly Doctrine Symposiums with Air University School students participation would be an

outstanding way to start “re-bluing” our air corps. The idea of establishing programs that would lead to critical doctrinal thinking by our premier schools is exciting. The thought is reminiscent of the days of the Air Corps Tactical School. This proposed marriage of ideas and talent could be the capstone learning event for our future Air Force leaders. The competition of ideas, research, and presentations could culminate in an annual “best-of-the-best” competition at the annual Doctrine Symposium. Having the Secretary of the Air Force and the Chief of Staff of the Air Force present annual awards would be a defining moment in anyone’s career. A panel of distinguished judges could have the final vote on who would take top honors. But even those who do not take an Air Force level award, this is one time, when just being nominated would truly be a career highlight. Competing would motivate even greater efforts for our forces to go back to basics, to aggressively pursue the concepts of air and space power. This could evolve into the preeminent air and space power brain trust. When a combatant command or the air staff had a significant air or space power doctrinal challenge, they could sponsor research. This approach would tie in all services and all CINCDOMS. The ultimate reward would be a competition at the Chairman, of the Joint Chiefs of Staff level. When this process matures into a joint service doctrine competition. Winners at that level could be presented awards by the Secretary of Defense and the Chairman of the Joint Chiefs. Each service could take turns hosting the competition. This level could become the academic equivalent of the Jim Thorpe Competition. The potential of the Air University—Doctrine Center marriage is unlimited.

Chapter 3 presented a look at the future of military aviation. Considerable time was spent discussing the F-22, the Joint Strike Fighter, and the F-18 E/F modernization.

These are very expensive platforms, \$350 billion. That amount of money is almost incomprehensible. Yet, when you factor in the time line and compare that to the overall defense budget (two percent), and the weapons modernization budget (sixteen percent); the figure is not nearly as compelling. Much of the debate about the tactical aircraft modernization plan is that there are so many segments of the Department of Defense that are in serious need of attention. Not only is the tactical aircraft buy very expensive, but it comes at a time when a peer competitor, and the subsequent threat they might present, just is not there. This does not mean that there are no threats in the world. As Chandler and Trees pointed out, the world is still a very ugly place. The proliferation of weapons of mass destruction is a grave international concern. Moore's Law made us aware of the unbelievable growth in commercial computer technology, which will occur in the next few decades. While this anticipated growth gives rise to concern about investing \$350 billion in today's technology, when we do not know what tomorrow's threat will really be. One of the main themes is the United States should strive to take advantage of this significant growth in the computer technology. Key to success in this arena is two fold—one, take advantage of commercial endeavors. There is no reason to spend government dollars to acquire technology that will be developed for free in the commercial sector. Second, given that point one is valid—the U.S. still needs to expend resources in computer technology research and development. However, the R&D effort should be limited to strictly military applications which the commercial sector will not support.

We also saw in *Chapter 3*, that the global positioning system, which was critical to our success in the Gulf War, will be a challenge in the future. Commercialization of the GPS will create some challenges for military users. However, if we plan well and expend

some R&D dollars to develop the technology, we should still be able to exploit this system during the next war. Meaconing, Intrusion, Jamming, and Interference works for the good guys as well as the bad guys.

The Gray Threat from European fighters, which may possibly end up in the hands of future adversaries, was determined to be another reason to fund the tactical aircraft modernization. The strength of these programs, the quality of the platforms should drive future decisions before it is too late to do anything about them. There are too many developing nations with funds available to purchase these weapons systems, to not build our new tactical fighters.

One of the main themes of *Chapter 3* was the debate about doctrine and technology. General Arnold's admonition to make doctrine drive technology still has merit, even fifty two years after he made his final report. The reality is that, while we are doing the best we possibly can, there is always room for improvement. This is an area where the Doctrine Center could pay big dividends. One of the significant concerns that make the \$350 billion decision so hard is that the rest of the Air Force Fleet is also aging very fast. A concerted effort needs to be maintained on the modernization of all platforms, but especially, tankers, airlift, and surveillance platforms.

At the outset of this research, the author was skeptical of the need for a new generation of fighter. The main reason for this belief was the tremendous success during the Gulf War. An inordinate amount of combat air patrol sorties were flown, to no avail. This left an indelible stamp of superiority on many people's mind. Yet, after researching hundreds of documents, the author reversed his opinion. The interpretation of the evidence supports this reversal. The great mistake made by many warriors and

commanders is that they prepare to fight the last war. Our future adversaries will surely study the lessons of the Gulf War, so should we. Doctrine should drive technology, which should drive acquisition—only the best for the brightest.

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